

Xueping Wu · Yiqun Ye

Technical and Vocational Education in China

 Higher
Education
Press

 Springer

Technical and Vocational Education in China

Xueping Wu · Yiqun Ye

Technical and Vocational Education in China

 Higher
Education
Press

 Springer

Xueping Wu
College of Education
Zhejiang University
Hangzhou, Zhejiang, China

Yiqun Ye
School of Foreign Languages
Zhejiang University of Science
and Technology
Hangzhou, Zhejiang, China

ISBN 978-981-13-0838-3 ISBN 978-981-13-0839-0 (eBook)
<https://doi.org/10.1007/978-981-13-0839-0>

Jointly published with Higher Education Press, Beijing, China

The print edition is not for sale in Mainland China. Customers from Mainland China please order the print book from: Higher Education Press.

Library of Congress Control Number: 2018945444

© Springer Nature Singapore Pte Ltd. and Higher Education Press 2018

This work is subject to copyright. All rights are reserved by the Publishers, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publishers, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publishers nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publishers remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Foreword

Of all human activities, Education is among the highest and noblest. As a social factor, it has been seen as “an engine of social development”, “a purifier of human harmony” and “an expression of culture”. Without education, the prospects for humanity would be bleak and world prosperity might be a mere dream. Civilization, social development and personal advancement are continuous with education: they precede and follow it. Nations, families and individuals stake their hopes on education. Because of its special role at all levels of human progress, education has been given priority in all ages in countries the world over.

As a result, humanity has accumulated a wealth of positive experience and, in the world’s long history, many intractable problems have been solved, setbacks have been tackled and challenges have been turned into opportunities. But we cannot rest on our laurels or stop addressing the present and the future. New challenges and problems have come as a consequence of the faster pace of change and expansion, which characterizes the new century. To promote steady and sustainable development and foster understanding among peoples in this increasingly global world of ours, we should never give up exploring new avenues and finding new opportunities. Education, as history shows, is perhaps the single best approach we can rely on to achieve our goals. With this background, mutual exchange and cooperation become all the more important.

China’s rise in the recent past has benefited from educational development spanning a period of nearly seventy years, beginning with the birth of the People’s Republic of China. China has made considerable strides and achieved enviable goals in the field of education during often very difficult times. Now, with the largest education system in the world, China is well on track in successfully achieving the “popularization of compulsory education” and the “massification of higher education”. Some of China’s achievements may surprise us: a modern education system is basically in place; vocational and technical education policy tries to meet the demands of social and economic development; the internationalization of education has set out along a broad avenue; educational policies and legislation are being regularly improved, etc. At the same time, however, China is still facing many hurdles and challenges in her task of further developing the

education system. Education is part of China's overall development, and as such it requires her own efforts, wisdom and innovation in order to set up and manage a modern education system able to respond to the unique challenges she faces. To sustain development, China needs to learn from the experiences, the achievements, the researches and experimentation of other countries, without underestimating, in the process, her own achievements and characteristics. With significant Chinese characteristics, Chinese educational development will also play an important role in the global educational system.

This year is the 40th anniversary of The Reform and Opening Up and the 5th anniversary of the Belt and Road Initiative. Along with the fast social and economic development in the past years, Chinese education has witnessed tremendous achievements due to the increasing public financial support, changing attitude towards education, and the progress of information technology. Mutual understanding is the precondition for international exchange and cooperation. However, up to now, foreigners have encountered many hurdles in trying to improve their knowledge of Chinese education. On the one hand, not many of them manage to achieve a working knowledge of the Chinese language and, on the other hand, there is an undeniable shortage of English literature on Chinese Education.

In order to help foreign friends and scholars know more about today's Chinese education, *Chinese Education Series* comes into being. This series include four volumes, namely **Educational Policies and Legislation in China**, **Educational Governance in China**, **Higher Education in China**, and **Technical and Vocational Education in China**. The various volumes endeavor to explain the context of Chinese education, to introduce educational development in the present situation, to analyze the problems as they develop, and to look forward to the future of Chinese education in different areas, with each author offering his or her own original perspective. We hope that the series have to some extent help global society to better know the outline and features of modern Chinese education, that it has aroused interest in it, and has encouraged readers to explore the legislation governing its development.

Many thanks are due to Higher Education Press and Springer, for undertaking the publication of the *Chinese Education Series*. I would also like to express my sincere appreciation to the authors who carefully revise the volumes with true professionalism and selflessness, while handling busy schedules, and to all the friends and colleagues who have offered invaluable criticism, advice and encouragement.

Hangzhou, China

Xiaozhou Xu



Prof. Xiaozhou Xu is an outstanding scholar in the field of comparative education and entrepreneurship education. He is Dean of the Academy of Humanities and Social Sciences at Zhejiang University, and Yangtze River Scholar Chair Professor of Ministry of Education of China. He is currently the holder of UNESCO Chair in Entrepreneurship Education and President of UNESCO Entrepreneurship Education Network National Chapter of China. He undertook international and national research projects from UNESCO, the World Bank, and the National Social Science Fund of China. He edited a range of influential series which cover Entrepreneurship Education Research, Changes in Higher Education Policy, 60 Years of Education in China, and Research on Strategy and Decision of Education Development. He has published over a hundred essays in academic journals and over ten monographs including *Building the Entrepreneurship Education System in University*, *Strategies of College Students' Entrepreneurial Skill Development*. Over ten research outcomes were rewarded by Ministry of Education of China and Zhejiang Province government.

Preface

Since the foundation of People's Republic of China in 1949, China's education has experienced nearly 70 years' of development. This was not an easy period for modern China. Just like what was said by Deng Xiaoping, the general designer of China's Reform and Opening Up, "Since there is no previous experience to fall back on, we need to wade across the stream by feeling the way." We must acknowledge that the reform in China has inevitably faced a lot of difficulties and frustrations, particularly in the first 30 years since the foundation of People's Republic of China. However, the introduction of Reform and Opening Up Policy in 1978 has brought China new ideas and a correct direction. Since then, tremendous developments have taken place. Human resources have been gradually regarded as the first productivity and thus education, through which creative talents are cultivated, has been given special attention in the policy of central government. If you thumb through the recent policy text, you will find that emphasis like "giving priority to education," "promoting the education equity," "to deeply implementing the strategy of developing the country through science and education and to strengthen the country by talented persons," "cultivating innovative and entrepreneurial talents" etc., have become the key guidelines of the educational policy in China.

As known to all, the educational development of a country is based on its economic foundation. Therefore, the making of the educational policies must be consistent with the real situation of certain historical periods. Since 1978, the educational policy in China has experienced mainly four stages: (1) The recovery and reconstruction of the educational order (1978–1984). Education in China suffered great losses during the ten-year's "Culture Revolution." So the basic framework of educational policies in this stage was to correct the wrong thoughts of education, recover and improve the basic educational system, commence on building an educational system and adapting to the economic construction. (2) The total start-up of educational system reform (1985–1992). During May 15–20, 1985, the first National Educational Conference since the introduction of Reform and Opening

Up was held in Beijing. In this conference, Deng Xiaoping put forward the necessity and urgency of transforming the oppressive burden of a large population to a huge human resource, which provided clear direction for the reform of the educational system. After the conference, the Decision on the Reform of the Education System was issued, which has been regarded as the milestone for the development of education. (3) The adjustment of educational policy facing the reform of the market economy system (1993–2002). In this period, several policies came into being, of which the Outline of Educational Reform and Development in China issued in 1993 and the Decision on Deepening Educational Reform and Promoting Quality Education in an All-round Way issued in 1999 were the most important. It can be concluded that the educational policies in this period mainly focused on basically realizing the Universalization of Nine-Year Compulsory Education and the Eradication the Illiteracy among the Middle-aged and Young Group until 2000; on the implementation of quality education, the development of vocational education, the expansion of higher education, the reform of educational system, the guarantee of educational funds, and so on. (4) The new development of the educational policy under the guidance of Scientific Outlook on Development (2002–Present). The rapid development of the economy and the realization of nine-year compulsory education have provided a sufficient foundation for the further reform of education in the new century. With the goal of constructing a harmonious society, giving priority to education, promoting education equity and enhancing the educational quality have become the key issues of this period. The great achievements of China's education should be due to the timely educational reform in different periods. The formulation and implementation of educational policies made the reforms possible. In China, with a special educational system, the educational policies have a direct impact on the development of education.

The scope of this book is clear: (1) analyzing the values which guide the formulation of China's educational policies and legislation; (2) introducing the basic framework of the educational policies and legislation in China; (3) presenting several educational policies which are the milestones in the development of China's education; (4) emphasizing four hot topics of policies, namely the policies of internationalization of education, private education, lifelong learning and teacher education.

This book is organized into eight chapters. Chapter 1 addresses the theoretic basis of educational policies in China, which is from the perspective of the education position, education quality and education equity. Chapter 2 looks at the major history and framework of the system of educational legislation in China, as well as the three important educational laws and legislations. Chapter 3 gives a detailed introduction to the outline and planning of educational development in China which has a profound impact to the reform and development of China's education. From Chapters 4, 5, 6 and 7, policies of educational internationalization, private education, lifelong learning and teacher education are respectively introduced. Beginning from the analysis of "the Policy on Chinese-foreign Cooperation

in Running Schools,” Chap. 4 focuses on the policies of studying abroad and the internationalization of higher education in China. Chapter 5 provides a close look at the history, the current development and the legislation and policies of private education in China, considering both the challenges and opportunities that lie ahead. In Chap. 6, we turn to policies of lifelong learning. Chapter 7 pays special attention to the teacher education system and teachers law in China.

Hangzhou, China
November 2016

Xueping Wu
Yiqun Ye

Contents

1 An Introduction to Technical and Vocational Education in China	1
1.1 History of Technical and Vocational Education in China	1
1.1.1 Technical and Vocational Education Before the Founding of the People's Republic of China	1
1.1.2 Technical and Vocational Education After the Founding of the Peoples' Republic of China	3
1.2 Technical and Vocational Education in the Mainland China	7
1.2.1 Current Situation of Technical and Vocational Education	8
1.2.2 Characteristics of Technical and Vocational Education	14
1.2.3 Problems with the Development of Technical and Vocational Education	18
1.2.4 Reform Tendency of Technical and Vocational Education	19
1.2.5 Policies and Measures Promoting Technical and Vocational Education	23
1.3 Technical and Vocational Education in Hong Kong, China	24
1.3.1 Current Situation of Technical and Vocational Education	24
1.3.2 Characteristics of Technical and Vocational Education	31
1.4 Technical and Vocational Education in Macao, China	33
1.4.1 Current Situation of Technical and Vocational Education	33
1.4.2 Characteristics of Macao's Technical and Vocational Education from the Year 2010	37
1.4.3 Problems with Technical and Vocational Education	38

1.5	Technical and Vocational Education in Taiwan, China	40
1.5.1	Current Situation of Technical and Vocational Education	40
1.5.2	Reform of Technical and Vocational Education	42
2	Vocational Training and Employment	45
2.1	Forms of Employment Transition	45
2.1.1	History of Vocational Guidance	46
2.1.2	Process of Vocational Guidance	47
2.1.3	Ways and Methods of Vocational Guidance	48
2.2	Training and Employment Market	51
2.2.1	Approaches and Policies of Employment	51
2.2.2	Policies of Employment	51
2.2.3	Current Situation of Labor Employment	53
2.2.4	Tracking Surveys and Services to Graduates	56
2.2.5	Developing Tendency of Vocational Training and Employment	58
3	Curriculum of Technical and Vocational Education	61
3.1	The Meaning and Characteristics of Technical and Vocational Education Curriculum	61
3.1.1	The Meaning of Technical and Vocational Education Curriculum	61
3.1.2	Characteristics of Technical and Vocational Education Curriculum	62
3.2	Setup Orientation of Technical and Vocational Education Curriculum	63
3.2.1	Setup Ideas of Curriculum	63
3.2.2	Setup Goals of Curriculum	64
3.2.3	Framework of Curriculum	65
3.3	Types of Technical and Vocational Education Curriculum	67
3.3.1	Knowledge-Based Curriculum	67
3.3.2	Competence-Based Curriculum	70
3.4	Development of Technical and Vocational Education Curriculum	72
3.4.1	Principles of Curriculum Development	72
3.4.2	Process of Curriculum Development	74
3.4.3	Main Models of Curriculum Development	77
3.5	Reform of Technical and Vocational Education Curriculum	81
3.5.1	Context of Curriculum Reform	82
3.5.2	Contents of Curriculum Reform	84
3.5.3	Tendency of Curriculum Reform	87
3.5.4	The Case of Curriculum Reform—Analysis of Reform of Secondary Technical and Vocational Education in Zhejiang Province	89

4	Specialty Setup of Technical and Vocational Education	97
4.1	Several Conceptions About Specialty Setup of Chinese Vocational Schools	98
4.1.1	Specialty Setup	98
4.1.2	Specialty Catalog	99
4.2	Fundamental Basis of Specialty Setup of Chinese Technical and Vocational Education	103
4.2.1	Training Objectives of Technical and Vocational Education	103
4.2.2	Demands of Society for Occupations (Professional Post Group)	105
4.2.3	Adjustment of Industrial Structure and Advancement of Science and Technology	107
4.2.4	Establishment of Characteristic and Competitive Specialties	108
4.3	Characteristics of Specialty Setup of Technical and Vocational Education	109
4.3.1	Expansion of Specialty Scale	109
4.3.2	Adjustment of Specialty Structure	110
4.3.3	Flexibility of Specialty Setup	112
4.3.4	Update of Specialty Name	115
4.3.5	Wide Connotation of Specialty	116
4.3.6	Normative Management of Specialty Setup	116
4.4	Current Situation of Specialty Setup of Technical and Vocational Education	117
4.4.1	Current Situation of Specialty Setup of Higher Technical and Vocational Education	117
4.4.2	Current Situation of Specialty Setup of Secondary Vocational Education	117
4.5	Administrative Document of Specialty Setup of Chinese Technical and Vocational Education	169
4.5.1	Administrative Measures of Specialty Setup of General Colleges, Higher Technical and Vocational Institutes	169
4.5.2	Principles and Suggestions on Specialty Setup of Secondary Vocational Schools	171
5	Teaching in Technical and Vocational Education	175
5.1	Teaching Modes of Technical and Vocational Education	175
5.1.1	A Brief Introduction	175
5.1.2	Some Common Teaching Modes	177
5.2	Teaching Methods of Technical and Vocational Education	183
5.2.1	A Brief Introduction	183
5.2.2	Some Common Teaching Methods	187

5.3	Teaching Organization Forms of Technical and Vocational Education	195
5.3.1	A Brief Introduction	195
5.3.2	Some Common Forms of Teaching Organization	196
5.4	Characteristics of Teaching of Technical and Vocational Education	199
5.4.1	Clear Vocation-Orientation	199
5.4.2	Behavior-Oriented Teaching Process	200
5.4.3	Integration of Theory and Practice	201
5.4.4	Cooperation of All Participants During the Teaching Process	203
6	Teachers of Technical and Vocational Education	205
6.1	Current Situation of Technical and Vocational Education Teaching Faculty	205
6.1.1	Structure of Teaching Faculty	205
6.1.2	Cultivating and Training System of Teaching Faculty	209
6.1.3	Management of Teaching Faculty	213
6.1.4	Problems with Teaching Faculty Construction	217
6.2	Traits and Requirements of Technical and Vocational Education Teaching Faculty	219
6.2.1	Traits of Teaching Faculty	219
6.2.2	Requirements of Teaching Faculty	224
6.3	Professional Development of Technical and Vocational Education Teaching Faculty	230
6.3.1	Professionalism of Teaching Faculty	230
6.3.2	Reflection on Professional Development of Teaching Faculty	234
7	Management of Technical and Vocational Education	241
7.1	Management System of Technical and Vocational Education	241
7.1.1	History of Management System	241
7.1.2	Current Situation of Management System	245
7.2	School Management of Technical and Vocational Education	248
7.2.1	Management System of Vocational Schools	248
7.2.2	Management Mode of Vocational Schools	253
7.3	Teacher Management of Technical and Vocational Education	258
7.3.1	Source of Vocational School Teachers	259
7.3.2	Appointment and Evaluation of Vocational School Teachers	261
7.4	Other Management of Technical and Vocational Education in China	264
7.4.1	Major Management and Curriculum Provision	264

7.4.2	Teaching and Training Management	265
7.4.3	Textbook Management	266
7.5	Thinking for Improving Technical and Vocational Education Management	267
7.5.1	Improving the Macro-Management of Technical and Vocational Education	267
7.5.2	Improving the Micro-Management of Technical and Vocational Education	271
8	Transformation of Technical and Vocational Education: From Quantity Expansion to Quality Improvement	277
8.1	Factors Pushing the Transformation Progress	277
8.1.1	The Needs of Self-development and Sustainable Development	278
8.1.2	The Needs of Economic Development	279
8.2	Policies to Improve the Quality of Technical and Vocational Education	279
8.2.1	Increasing the Educational Vitality	279
8.2.2	Enhancing Teaching and Training Efficiency	281
8.2.3	Improving Management and Evaluation	283
8.2.4	Completing External Guarantee Mechanism	284
8.3	Cases of Transformation of Technical and Vocational Education	287
8.3.1	Cases of Increasing the Educational Vitality	287
8.3.2	Cases of Enhancing Teaching and Training Efficiency	289
8.3.3	Cases of Measures to Improve Management and Evaluation	291
8.3.4	Cases of Completing External Guarantee Mechanism	292
8.4	Construction of Modern Apprenticeship as a Supplement to the School Based Technical and Vocational Education System	294
8.4.1	Institutional Barriers to Skilled Personnel Training	294
8.4.2	Problems in School-Enterprise Cooperation	296
8.4.3	Modern Apprenticeship: A Supplement to the Vocational Education System	296
8.4.4	Pending Issues to Be Solved	298
8.5	Achievements in Technical and Vocational Education Attained in the Past Five Years	299
	Summary	301
	References	303

About the Authors



Dr. Xueping Wu is a professor at College of Education of Zhejiang University, China. From 1990 to 1991, she worked at Sussex University in the UK as a visiting scholar. Her major is comparative education, and her special area of research is technical and vocational education. She often attends international conferences on education and keeps a close relationship by academic exchange and cooperation with foreign scholars in the UK, the USA, Italy, Germany, Japan, Korea, Sweden, Denmark, etc. She is the first author of the work *Technical and Vocational Education in China* published in 2009 (in English), and 2012 (in Italian). Her monograph includes *International Research on Technical and Vocational Education* (Zhejiang University Press, 2004), *Research on Policy of Higher Vocational Education* (Zhejiang Education Press, 2007), and *Comparative Research on Mechanism of Promoting Lifelong Learning* (Zhejiang University Press, 2010).

Yiqun Ye is an associate professor at School of Foreign Languages of Zhejiang University of Science and Technology. Besides her study on students' work-study program of American institutions of higher learning and federal students aid program of the USA, she conducted her research on technical and vocational education in China, and she was the co-author of the work *Technical and Vocational Education in China* published in 2009 (in English), 2012 (in Italian), and the essay *Vocational Education* in 2013. From 2014 to 2015, as a visiting scholar in Valparaiso University of the USA, she made studies on professional development of teachers of community colleges.

Chapter 1

An Introduction to Technical and Vocational Education in China



1.1 History of Technical and Vocational Education in China

Technical and vocational education in China has gone through a long, tortuous course. Counting from the commencement of industrial and commercial education in the 1860s, the earliest technical and vocational education in China has a history of more than 150 years. However, because of the traditional concept “excellent learning assures a decent career;” and the underdevelopment of modern industries in China, the development of the technical and vocational education had been deterred.

1.1.1 Technical and Vocational Education Before the Founding of the People’s Republic of China

The earliest technical and vocational education in China can be traced back to education for industrial development, which was initiated in the 1860s, the main aim was to study Western technology and provide workers with practical skills. After the Opium War in 1840, advocates of the Westernization Movement initiated military enterprises which required technicians and workers who had a grasp of advanced technology. This led to the introduction of colleges of industry and commerce in China. The beginning of technical and vocational education system came into being with the set-up of vocational schools. During the Westernization Movement in the 1860s, the Qing Dynasty (1616–1909) began to establish modern mining and transportation industries and industrial schools. In 1904, the Qing government issued The Constitution of Imperial Schools, which brought industrial education in line with the formal education. That was a symbol of the establishment of school-typed vocational education system. The earliest college of industry and commerce was the Imperial College, or Tong Wenguan, which was established in Beijing in 1862 to train interpreters. After that, some Military and industrial colleges followed, such

as the Boating College established in Mawei, Fujian Province in 1866, the Machinery College, established by Shanghai Manufacture Bureau in 1867, and the Driving College, established at the Fuzhou Boating Factory in 1873. After the Westernization Movement, with the development of economy and the launch of the Reform Movement of 1898, various industry and commerce colleges were established with the aim of producing technicians and workers, for example, the Military Preparation College established in Tianjin in 1885, the Commerce College established in Hubei in 1891, the Mining College established in Hubei in 1892, and the Silkworm Breeding and Mulberry Growing College established in Jiangxi. The Qing government formalized the status of industry and commerce education in education system. The industry and commerce colleges were divided horizontally into three kinds: Formal industry and commerce colleges, continuation industry and commerce colleges, and normal industry and commerce colleges; vertically they were divided into three levels: Elementary, secondary and higher level, and each level included subjects like agriculture, industry, commerce and boating which formed a system. At the turning of the twentieth century, the 1903 Zouding School Regulation laid down a set of systematic regulations for vocational education.

The first civil revolutionary against feudalism in China in 1911 finished the domination of the Qing Dynasty, it also created a new stage in the development of vocational education. In the Command on Industry and Commerce and the Regulation on Industry and Commerce, the Government of the Republic of China stipulated that the aim of industry and commerce colleges was to help students acquire the necessary knowledge and skills of agriculture, industry and commerce. The schooling was changed from the original three levels of elementary, secondary and higher into first and second levels. The first level was equal to the secondary industry and commerce colleges at the end of Qing Dynasty which were organized according to provinces. The second level was equal to the elementary industry and commerce colleges at the end of Qing Dynasty, which were organized nationally. The higher industry and commerce colleges were changed into professional schools which were under the Centre and the Provinces. In the Reform of the School System, industry and commerce colleges were changed into vocational schools which had three levels: Primary, secondary and higher, with more subjects. Up to this point, a preliminary system of technical and vocational education was formed.

In 1917, Huang Yanpei, Cai Yuanpei and Tao Xingzhi, as well as some others initiated the establishment of Chinese Vocational Education Society, setting the precedent for vocational education to be provided jointly by the education and industrial sectors in China. It was the first organization in modern China whose mission was to study, provide and advocate for technical and vocational education. The society helped its students to acquire knowledge and skills in agriculture, industry and commerce and began a new stage in the development of technical and vocational education. In the same year, *Education and Vocation*, the first publication to promote vocational education, was issued. In the first annual meeting of Chinese Vocational Education Society, the Founder of the Society Huang Yanpei stated that the aim of vocational education was to “prepare young people to make a living, to prepare individuals to serve the society, and to prepare people to improve production in China

and all round the world". Based on this aim, the present vocational education system has been formed, which characterizes its full-time and various levels of vocational schools as the core, attached to short-term training.

After spending many years in vocational education, Huang Yanpei came to the conclusion that the school was a process of "socialization". He thought that it's appropriate to design vocational schools on the basis of social needs. Under the guidance of his thought, Chinese Vocational School was established in Shanghai and it was operated on four key principles: (1) acquiring practical knowledge; (2) becoming familiar with required skills; (3) assimilating moral principles, and; (4) improving productivity. Huang Yanpei's technical and vocational education philosophy not only improved the development of technical and vocational education in China, but also helped to lay the theories underlying modern technical and vocational education.

Before the founding of the People's Republic of China, in the revolutionary bases and Liberated Areas led by CPC, technical and vocational schools were also established under the leadership of the CPC. For example, the Central Agricultural School was established in Ruijin, Jiangxi Province, in 1933; the school carried out a work-study program. The Agricultural School, Industrial School and Medical Schools were established in the Shanxi-Gansu-Ningxia Border Region. The Textile School was established in the Liberated Areas of Central China, while the Finance Cadres School was established in the Jiangsu-Anhui Liberated Areas. Those schools helped cultivate a lot of cadres and technicians.

Prior to 1949, however, slow economic progress and industrial development hampered the promotion of technical and vocational education in China. In that year, there were only 561 secondary technical schools with a total enrollment of 77,000 students, and 3 schools for training skilled workers with only 2700 students (CERNET 2000).¹ This is the period which lays the foundation for technical and vocational education in China.

1.1.2 Technical and Vocational Education After the Founding of the Peoples' Republic of China

In the 67 years since the founding of the People's Republic of China in 1949, technical and vocational education has gone through a process of adjustment, correction, manifestation, reform, improvement, and finally steady development. In the 1950s, thousands of specialized secondary schools and skilled-worker schools were set up to meet the needs of economic expansion. In the first national education meeting after the founding of the People's Republic of China, it was pointed out that the old situation of the disproportion between general education and technical and vocational education should be reformed. In 1953, the State Council instituted the guiding principles for developing secondary vocational schools: To rectify and consolidate,

¹China Education and Research Network (CERNET) (2000). Vocational Education in China (I). Retrieved March 19, 2012, <http://www.edu.cn/20010101/21929.shtml>.

to develop with focus, to improve quality, and to develop steadily. Following the principles, the first measure taken was to build up the secondary technical and vocational education system. In 1954, the State Council issued the Decision on Improving Secondary Technical and Vocational Education and in the same year approved the Regulation on Secondary Special Schools issued by the Ministry of Education to reform and develop secondary vocational education. The second measure was to create and promote a system of technical schools to train technicians needed for the construction of important projects. In this way, the system of technical and vocational education that was initiated in China came to focus on secondary vocational schools and technical schools. By 1957, enrollment in secondary vocational schools and technical schools was 844,833—or 48.3% of the total number of students—compared to 904,000 general middle-school students (51.7%) (CERNET 2000). The secondary technical and vocational education system basically satisfied the needs of economic construction.

In the 1960s, the worker training that was badly needed in all sectors of society was accelerated and agricultural secondary schools and other vocational schools developed rapidly. During the 20 years from 1958 to 1976, technical and vocational education in China initially experienced fast development, with many vocational schools being set up and a large number of students being enrolled. But there were two big obstacles in this period: The first was the blind development during the period of “Great Leap Forward”, while the second was the serious destruction suffered during the “Cultural Revolution”. The development of technical and vocational education progressed steadily and reached its peak after the founding of the People’s Republic of China, when a great number of schools and students rose rapidly. The pace of growth was too much, and hence quality remained a problem; it was necessary to adjust the growth of vocational education. In 1961, the Ministry of Education decided to adjust the scale of vocational education. However, after the narrowing of vocational education, general education became the only concern in secondary education. So in 1963, the Central Government issued the Discussion on Drafts of the Work of Full-time Primary and Secondary Schools and Several Directions, stipulating that the policy of developing both general education and technical and vocational education should be carried forward. Thus, technical and vocational education was resumed and put on the path of steady development once again. But the period didn’t last long. During the “Cultural Revolution”, the pace of development of technical and vocational education was dramatically affected, the term for secondary education was reduced from six to four years, resulting in a rapid expansion in the number of secondary education students. Consequently, resources were spread too thinly and education quality declined. This situation was exacerbated by the fact that the increase in enrollment was limited to regular secondary schools; technical schools were closed during the Cultural Revolution because they were viewed as an attempt to provide inferior education to children of worker and farmer families. Many vocational schools were closed as well. In 1976, general senior high schools constituted 94.2% of secondary schools, compared to the 5.8% represented by secondary voca-

tional schools and technical schools (Wu 2004).² The single structure of secondary education not only stunted the development of vocational education, but also lowered the quality of general education; education was divorced from individual and societal needs.

In the later 1970s there was widespread criticism of what was termed the “unitary” approach of the 1960s, with critics arguing that it ignored the need for two kinds of graduates—those with an academic (college preparatory) education, and those with specialized technical (vocational) education. Technical schools began to reopen in 1976 with renewed emphasis on technical training and increasing enrollments. In the face of the drive to expand vocational and technical education, regular secondary-school enrollments fell. In 1978, a historic era of reform began with the opening policy to the outside world and the development of vocational education has been injected with vitality. Since the Third Session of the Eleventh Central Committee of the Party, the Party and the government have encouraged technical and vocational education very much and have clarified the status and role of technical and vocational education in the education system and the country’s development. In 1978, at the national education meeting, Deng Xiaoping pointed out that education should meet the needs of national economic development and that the ratio of different kinds of in the education system should be proportional, especially with regard to agricultural schools, secondary vocational schools and technical schools. In 1979, it was pointed out in the Government Work Report that it was an urgent need to develop various secondary vocational schools within secondary education; it would help to solve the employment problem of the massive graduates.

In 1980, the Report on the Structural Reform of Secondary Education was formulated by the Ministry of Education and the State Bureau of Labor and ratified by the State Council. It stated that the structure of secondary education should be reformed and that vocational education should be developed so that the senior secondary schools could meet the needs of socialist modernization. In 1985, the Chinese Communist Party (CPC) Central Committee announced the Decision on Structural Reform of Education, clearly stipulating that a vocational education system should be established. The system was to have a rational structure and intermediate stages from the junior to senior level that corresponded to industrial sectors and connected with regular secondary education. While technical and vocational education was still very weak in the whole education of our country, effective measures should be taken to improve the situation and develop vocational education. It also clearly pointed out that “a technical and vocational education system that combines both elementary and higher levels, supported by different industries and with reasonable structures, should be established.”³ The important document made clear the status and role of technical and vocational education in modern construction and it pushed forward the development of vocational education. In 1986, universal secondary education was addressed

²Wu Xueping (2004). *International Research on Technical and Vocational Education*. Beijing: Beijing Education and Science Press.

³Documents Compilation of National Vocational and Technical Education Meeting. (1986). Beijing: Beijing Normal University Press: 7.

as part of the Compulsory Education Act that made 3-year junior secondary education mandatory. Under education reform, however, the desire to improve the quality of key junior secondary schools was more important than expanding enrollment.

In 1991, the State Council formulated the Decision on Energetically Developing Vocational and Technical Education, which identified tasks and objectives for developing vocational education further in the context of Chinese economic and social development in the 1990s. Vocational education was featured even more prominently with the release of the Outline on Reform and Development of Education in China in 1993. Drawn up by the CPC Central Committee and the State Council, it required governments at various levels to attach great importance to vocational education, to create comprehensive plans instituting it, and to develop vocational education energetically. The outline was aimed at mobilizing the initiative of all departments, enterprises, institutions, and other quarters of society to provide vocational education in multiple forms and at different levels. In 1996, the Vocational Education Act became effective, requiring the state to establish and perfect a vocational education system in China. A year later, in the Report of the Fifteenth National Congress, President Jiang Zeming pointed out the need to implement the strategy of reinvigorating China through science, technology, and education while keeping development sustainable, and to actively develop various forms of vocational and adult education. In 1999, the Decision on Deepening Education Reform and Promoting Quality Education was released. It emphasized that an education system adapted to the socialist market economy in which different types of education were integrated with each other should be established, and that vocational education and senior secondary education(both regular and vocational) needed to be actively developed. In a word, since China's reformation and the opening up to the outside world, technical and vocational education has made great progress. Vocational schools of different levels have achieved a lot, and they have provided a great number of qualified workers and technicians to the socialist modernization construction. But the reform of technical and vocational education is also faced with problems. People in some places were unaware of the importance of technical and vocational education so the input was inadequate and the basis was weak. The management and schooling systems along with the teaching quality couldn't meet the needs of the economic construction and social development. The employment access system was not well carried out which influenced students' initiative, and the development of different areas was unbalanced. In order to carry out the Vocational Education Law of the People's Republic of China, and to implement the strategy of invigorating China through science and education and to improve the reform and development of vocational education, in September 2002, the State Council issued the Decision on Improving the Reform and Development of Vocational Education. The document laid out seven ways in which vocational education was to be reformed and developed: (1) Recognize the important status of technical and vocational education in socialist modernization construction, make clear the target of technical and vocational education reform and development during the period of the 11th Five-year Plan. (2) Implement the reformation of the educational and schooling systems, promote the combination of vocational education, economic construction and social development. (3) Deepen the educational and

teaching reform, to meet the needs of the society and enterprises. (4) Take measures to improve technical and vocational education in rural and western areas. (5) Carry out employment access system, strengthen the linkage between technical and vocational education and employment. (6) Develop new ways to raise funding for vocational education. (7) Strengthen the leadership, and to develop a healthily process for improving vocational education. The document had a far-reaching impact on improving vocational education. The regulations and laws described above not only have created an unprecedentedly good social environment for advancing vocational education, but also have provided a road map for further progress in the 21st century.

Presently, considering the regional difference of economic and social development, China is trying to establish a technical and vocational education system that guarantees a simultaneous and interconnecting development of school education and short-term training. Today, when talking about vocational education, there are three terms which have the same meaning: vocational education, vocational and technical education, technical and vocational education and training, the third term is adopted by UNESCO. In this book, the term “technical and vocational education” is preferred. Today, technical and vocational education in China includes two parts: technical and vocational school education and technical and vocational training. School education in secondary and tertiary level is the back bone of Chinese vocational education system.

1.2 Technical and Vocational Education in the Mainland China

It is stipulated in Article 12 of the Vocational Education Law of the People’s Republic of China that “the state shall, in accordance with the economic development level and the situation of universal education of various regions, implement the educational division at different stages mainly after junior middle school, institute and improve a technical and vocational education system under which technical and vocational education and vocational training shall be developed concurrently, and technical and vocational education shall be connected with other forms of education with coordinated development of both.” We can see that technical and vocational education in mainland includes two indispensable parts: One is vocational school education, the other is vocational training. The two parts are equal in status and complement each other. Vocational schools can be divided into three kinds: Elementary, secondary vocational and higher vocational education. The first two kinds are carried out by the elementary vocational schools and secondary vocational schools respectively; the higher technical and vocational education is carried out by higher vocational schools or higher schools according to the situation.

Vocational training includes training before employment, apprentice, on-the-job training, job transfer and other vocational training, according to the situation needed. Vocational training is carried out by appropriate vocational training institutes and vocational schools.

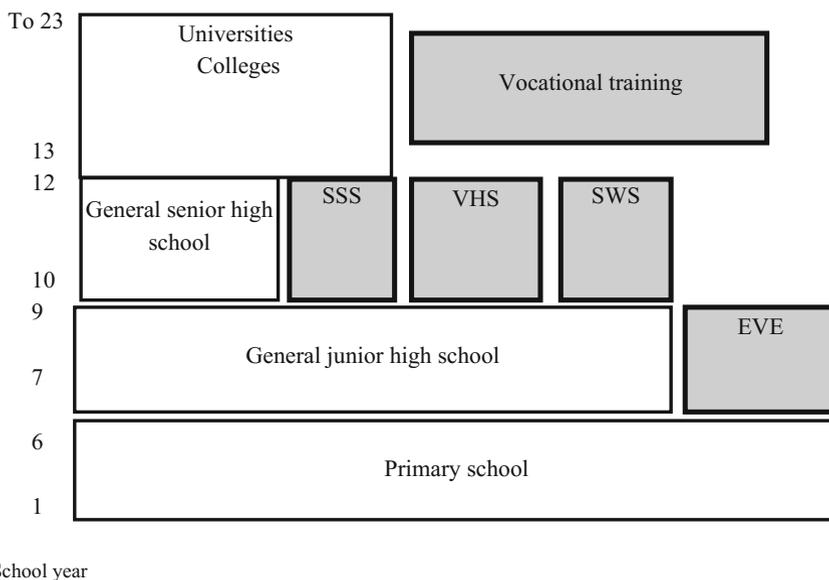
1.2.1 Current Situation of Technical and Vocational Education

After about 60 years of hard work, especially the vigorous development after the reform and opening up China, the technical and vocational education system has made some achievements with Chinese characteristics, from primary to the higher levels. According to the statistics, in 2014, there are 12,000 elementary and secondary technical and vocational schools, enrolled 6,983,000 students with 19,602,000 in-school students, taking up 45.9 and 44.5% of high education. The number of independent higher vocational colleges is 1321 with 9,736,000 in-school students, taking up 45.5 and 39.5% of higher education.⁴

The development of technical and vocational education not only enlarges its size, but also changes its structure. The development of secondary technical and vocational education optimizes the education structure in the senior middle school stage. But the development of technical and vocational education is also facing some problems. The first problem is that the management system is not reasonable. The poor management results in resources that can not be fully used, which lowers efficiency. The second problem is that the basis of technical and vocational education is weak, because the local development is unbalanced. Some vocational schools in rural areas hardly have any students, and the variety curriculum that can be offered for the secondary technical and vocational education is greatly reduced. The technical and vocational education program in rural and western areas is underdeveloped. The third problem is that the connection between technical and vocational education and the labor market is not so tightly coordinated. The mode of school management, in the areas of curriculum development, teaching content, and teaching methods can not meet the needs of the labor market. The fourth is that of industry fails to fulfill its responsibility towards vocational education. The number of industrial secondary vocational schools have been reduced or closed with decreasing enrollment numbers. The fifth problem is that the access to the employment system and the vocational qualification system are not properly implemented in some areas, also enterprises and employers enroll a great number of workers who have not received the necessary training. The last problem is that the input of vocational education is insufficient, therefore the school's efficiency and facilities are not satisfactory.

⁴Enrollment of Technical and Vocational Education in 2014. <http://news.51edu.com/news/4903.html>, [2014-06-26].

Table 1.1 Chinese vocational education system



Note: *SSS* Secondary Specialized School, *VHS* Vocational High Schools, *SWS* Skilled Worker School, *EVE* Elementary Vocational Education

1.2.1.1 Vocational School Education

The current vocational school education can be divided into three levels: Elementary, secondary, and higher education, with secondary vocational schools constituting the majority (Table 1.1).

Elementary technical and vocational education refers to technical and vocational education primary school as part of the nine-year compulsory education in China. It is conducted mainly in junior vocational schools. Primary vocational high schools enroll graduates of primary schools with a schooling of three to four years. They cultivate workers, farmers and other employees who have basic knowledge and skills. This kind of schools are located primarily in under-developed rural areas so that the labor requirements of rural development can be met. Students in primary vocational high schools have basic cultural courses and receive skills training which take about one year. So this kind of education is a form and a part of popularizing the nine-year compulsory education. In some underdeveloped areas where the nine-year compulsory education is not popularized, the primary technical and vocational education helps to push forward the implementation of compulsory education and to train primary vocational workers for those areas to improve their local economic development.

Secondary vocational school education is the technical and vocational education in the stage of senior high school. It is the main body of secondary education. It aims

at cultivating middle-level skilled workers and service personal with relative all-round competencies. After 20 years' development, the ratio of vocational in-school students in senior high school to in-school students rose from 20% at the beginning of 1980s to more than 50%,⁵ which could meet the needs for economic and social development. Secondary vocational schools mainly cultivate secondary technicians, management staff and workers. Graduates of these schools can both graduate directly and register for the entrance examination to higher vocational schools and normal higher schools, to pursue further study. There are mainly three kinds of schools that carry out this kind of education: Vocational High Schools, Secondary Specialized Schools and Skilled Worker Schools.

Vocational High School is developed on the basis of reforming secondary education structure since 1985, most of them are re-constructed from original general high schools. Vocational High Schools are managed by education authority, enroll graduates of Junior High Schools mostly with a schooling of three years, but it's also common to have two to four-year schooling. Vocational high schools are divided into several academic areas, including engineering, agriculture, medicine, finance, politics and law, physical culture, cultural education, art and travel. There are more than 100 majors, and each major has its own goals and specifications.

The Secondary Specialized Schools is a kind of school developed on the basis of taking over and reforming older vocational high schools after the founding of the People's Republic of China. Now these schools mainly enroll graduates of Junior High Schools with a schooling of 3 years and specific schooling of five years. They have the same task as that of the Vocational High Schools. Department in charge of these schools are sector administration organs or education authority. The major catalogue of secondary vocational school can be divided into engineering, agriculture, forestry, medicine, normal, finance, physical culture, and art. There are more than 400 majors. With the improvement in the requirements for teachers' academic attainments, the secondary normal schools, which originally aimed at cultivating teachers of primary schools and kindergartens gradually closed down. There were combined or upgraded into higher normal schools.

Skilled Worker Schools are developed on the basis of various transient employment training classes, which are used to training the 4,000,000 laid-off workers in cities after the founding of the People's Republic of China. Skilled Worker Schools enroll graduates of junior high schools with a schooling of 2-4 years, cultivating skilled workers in industry. Their training programs and learning arrangements are much more practically oriented compared with those in Vocational High Schools and Secondary Specialized Schools. Skilled Worker Schools are managed by labor authority.

The existence of three kinds of secondary vocational schools is mainly owing to historical reasons, e.g. the intersecting of the management competence among the Ministry of Education and the Ministry of Human Resource and Social Security. At present, there isn't much difference among the training targets and learning contents

⁵National Education Development and Research Center (China Education Green Paper). (2000). Beijing: Education and Science Press: 56.

of these kinds of schools. Therefore a new comprehensive name, Secondary Vocational and Technical School, is gradually replacing the three former school names.

The higher technical and vocational education is developed on the basis of secondary education; it belongs to the education at tertiary level's (education after senior high school). This kind of education was developed as the senior level of technical and vocational education system after 1980. The first higher vocational school—Nanjing Jinling Vocational University—was founded after the reform and opening up to the outside world. But being new, it did not draw much attention. Through gradual development in the 1980s, higher technical and vocational education became a topic of general interest among educators. In the Decision on Developing Vocational Education, the State Council set a task of “building up a series of higher vocational schools that cultivate higher operators with excellent skills.” In 1994, the Ministry of Education put emphasis on “improving the reform and construction of vocational colleges.” Since the end of last century, the construction and developing of higher vocational education has become an important area in education. Higher technical and vocational education is carried out by the higher technical and vocational colleges. Now these colleges are mostly vocational universities, technical and vocational colleges and higher training schools.

The Vocational and technical college is the most important type of higher vocational education institutions that develop quickly in recent years. They enroll graduates of high schools and secondary vocational schools with a schooling of two to three years, cultivating higher practical personnel.

The vocational university is developed according to the needs of local construction. They are mostly built by provincial or municipal governments in cities where the economy developed fast in the 1980s. They mainly aim at cultivating higher practical technical personnel. The courses are arranged accordingly, for example, secretary, tourism, higher repairing technology, etc. Meanwhile, these universities usually arrange universal courses that provide services for local development, for example, normal education, foreign language, and machinery. The teaching plans are set flexibly according to the local needs. So, the trait of the vocational university is local, and students study at their own expenses. Vocational universities enroll graduates from high schools, secondary technical and vocational schools with a schooling of two to three years. Graduates can go on to achieve higher college academic attainments. Some of vocational universities also have 4-year undergraduate programs.

Higher colleges were established in the 1950s. As a form of transient education, higher college was regarded as a supplement to the insufficiency of secondary vocational education. Higher colleges enroll graduates of high schools and secondary vocational schools with a schooling of 3 years, cultivating technical personnel and managers, and teachers for kindergartens and primary schools.

Higher technical and vocational education institutions have developed quickly in recent years. They enroll graduates from high schools, secondary technical and vocational schools with a schooling of two to three years. Many majors are available to the cultivation of practical higher technical personnel and managers. The schooling of technical and vocational normal colleges is four years, mainly cultivating majors or internships training teachers for secondary technical and vocational

Table 1.2 Vocational schools and colleges in 2008 (MoE 2015)

Type of school	Number of schools	Number of students
Secondary specialized schools	5829	9379.3
Vocational senior high schools	5915	7503.2
Vocational and technical colleges	1184	9168.0
Skilled worker schools and technician institutes	3103	3988.5
Total	16031	30039.0

Ministry of Education (2010). National Medium- and Long-Term Educational Reform and Development Guidelines. http://www.china.com.cn/policy/txt/2010-03/01/content_19492625_3.htm. Accessed 05 April 2015

schools. According to statistics, in 2002, there were 767 higher technical and vocational colleges with a total of 1,934,000 students. Among them, the separated higher vocational technical colleges enrolled 763,000 students, with a total of 1,610,000 in-school students. The ratio of enrollment and in-school students rose from 23 to 29% compared to that of the previous year. So the development of technical and vocational colleges is excellent.

In the 1950s, as a form of transient education, a higher college was regarded as a supplement to the secondary vocational education. As to its aim, it belongs to technical and vocational education. After 1983, higher colleges have made great progress and have become more and more diverse. According to the cultivation aim and graduates employment, many colleges belong to higher technical and vocational education. Higher colleges enroll graduates of high schools, secondary vocational schools with a schooling of two to three years. They mainly cultivate vocational technical personnel and managers, while normal colleges cultivate teachers for kindergartens, primary schools and some junior high schools. Up to 2008, different types of vocational schools and colleges have been set up, providing different levels of technical and vocational education (see Table 1.2).

Since the end of last century, the central government began to attach importance to vocational education. The capacity of vocational education is continually expanded. According to the statistics of the Ministry of Education, in 2009, there are 14,401 secondary vocational schools with an enrollment of 8.6852 million students. The enrollment of secondary vocational schools accounts for 51.1% of the total enrollment in the period of senior secondary education, up by 5.5% over 2006 (Ministry of Education 2015). In 2015, there are 11,200 secondary vocational schools with 16.567 million in-school students, 1341 higher technical and vocational colleges and 10 million in-schools students.⁶

⁶China Education Overview 2015. http://www.cfen.com.cn/sjpd/hg/201612/t20161221_2493426.html. 2016-12-1.

1.2.1.2 Vocational Training

Vocational training is a kind of training aiming at employment, job changes or improving vocational skills. According to the level of technology training, it can be divided into three levels—primary, intermediate and a higher level. Its training objectives, time, contents and requirements will vary according to the different jobs and types of task in production. Passing examination, trainees can get occupational certification. According to the statistics, there were more than 2000 training centers and over 400,000 training centers for workers, adult technology training schools and various training institutes (MoE 2015).⁷

After the founding of the People's Republic of China, vocational training had improved quickly. At first, more than 4,000,000 jobless workers had to be trained for six months before taking new jobs. In the 1960s, with the development of general high schools, there were about 100,000 graduates every year, some of them did not have the chance to get further study. In order to arm them with vocational skills, on-the-job training classes were offered to carry out vocational training in 1964 and 1965. The vocational training was rapidly advanced after the Third Session of the Eleventh Central Committee of the Party. It was pointed out in the 42nd Document issued by CPC Central Committee and the State Council that "it is necessary to train the unemployed youths in towns, making sure that everyone gets some training before they go to work." It is stipulated in Article eight of the Vocational Education Law of the People's Republic of China that "the state shall adopt a system under which workers shall receive the necessary technical and vocational education before they take up occupations or go to their posts." Thus the vocational preparatory system of "training before employment" was established and it was followed by prosperous development of vocational training. In 2002, there were 389,500 adult technical training schools, where 81,188,000 people received training. Among them, there were 379,100 farming technical training schools, where up to 76,810,000 farmers received training. Reemployment in cities and the training of laid-off workers were in progress, too. According to the statistics, there were more than 2000 training centers, and over 400,000 workers' training centers, adult technology training schools and other various training institutes.

In cities, training before employment is usually managed by Departments of Labor as well as their vocational training centers, while in rural areas, it is managed by vocational schools and various adult educational institutes. The main forms of running a training institute in cities are: Training can be organized or held by the Departments of Labor and Employment, or by the Departments of Labor in collaboration with enterprises, with short-term training given by various vocational schools. Training before employment can also be offered by the Departments of Labor and the Department of Education, with short-term training given by the Chamber of Commerce in collaboration with industry, labor unions, women's federations and the various communities.

⁷Ministry of Education (2010). National Medium- and Long-Term Educational Reform and Development Guidelines. http://www.china.com.cn/policy/txt/2010-03/01/content_19492625_3.htm. Accessed 05 April 2015.

Training after employment has many requirements and forms. Its aim is to improve or renew the professional knowledge and skills of in-service workers. The training varies according to the requirements of one's major, technical level and job transfer. In training after employment, the training of in-service workers is the main part. It is stipulated in Article 20 of the Vocational Education Law of the People's Republic of China that "Enterprises shall, in accordance with their actual situation, give technical and vocational education in a planned way to their staff and workers and persons to be employed". The training program within enterprises depends on practical needs. Enterprises may jointly run or run on their own vocational schools and vocational training institutions; they may also entrust vocational schools or vocational training institutions with the technical and vocational education of their staff, workers, or persons to be employed by them. Staff and workers engaged in technical work must receive proper training before going to their posts. Staff and workers engaged in special work must receive relevant training and obtain certification for those special posts." The enterprises should shoulder the expenses of training workers. The plan and program of training within enterprises depends on the practical needs. The methods of carrying out training are mostly as follows: Case study, on-the-spot teaching, post practicing, research study, and psychological simulation.

1.2.2 Characteristics of Technical and Vocational Education

1.2.2.1 Enlarge Scale and Unbalanced Development of Vocational Education

Over the years, China has been insisting on keeping a balance between secondary technical and vocational education and normal high school education. Meanwhile, the scale of higher technical and vocational education has enlarged. In 2001, the number of in-school students in vocational schools at the high school stage (including vocational senior schools, normal secondary vocational schools, adult secondary schools and technical schools) was 11,703,400. The number of in-school students rose from 5.92 million in 1996 to 7 million in 2001. The number of key demonstration vocational schools increased constantly. More than 1200 national key vocational schools and more than 2000 provincial key vocational schools have been established. The adult technical training schools have trained a total of 92.7 million people and there are millions of employees joining various informal technical and business training classes.⁸ The higher technical and vocational education is also developing very fast. In 2001, there were 386 independent higher vocational colleges, and 717,000 in-school students. Together with other higher vocational colleges, established by the

⁸National Education Development and Research Center (China Education Green Paper). (2000). Beijing: Education and Science Press: 11.

Table 1.3 Enrollment of secondary vocational schools and higher vocational colleges from the year 2007 to 2014 (million)

Enrollment/Year	2007	2008	2009	2010	2011	2012	2013	2014
Secondary schools	8.10	8.121	8.685	8.704	8.138	7.451	6.747	6.197
Higher vocational colleges	2.838	3.106	3.133	1.305	3.248	3.147	3.184	3.379

Yu zhijing, etc. (2016). *Tranferring from a Great Nation to a Powerful Nation of Technical and Vocational Education*. Technical and Vocational Education. 2016(6): 12

higher schools, the number of in-schools students was 6,397,500.⁹ In order to meet the needs of social construction, during the 10th Five-year Plan period, technical and vocational education would have to cultivate more than 22 million secondary vocational school students and more than eight million higher vocational school graduates. Each year about 50 million workers in towns and cities and 150 million rural laborers need to be trained, besides an additional more than three million laid-off workers receiving reemployment training.¹⁰ In 2015, there are over 10,000 secondary vocational schools with 18,000,000 in-school students while the number of higher vocational colleges is 1200 with 10,000,000 in-school students.¹¹

Though the scale of technical and vocational education in the mainland is wide, the development of technical and vocational education is unbalanced. Influenced by many factors, the state of technical and vocational education varies from area to area. Some developed faster than others. Some developed with a high quality than others. Some developed steadily while others declined (Table 1.3).

1.2.2.2 Macro Management of Technical and Vocational Education

During the process of technical and vocational education development, a technical and vocational education system has been established under the leadership of the State Council. It is a system planned by the government, managed locally and includes social involvement. Under the leadership of the State Council, the system of joint meetings among the departments of technical and vocational education was established to study and solve the problems in vocational education. The Ministry of Education takes charge of the planning, coordinating, and macro management. The Ministry of Labor and Social Security and other ministries take charge of relative work of technical and vocational education within their respective responsibilities. The Vocational Education and Adult Education Division is placed under the

⁹National Education Development and Research Center (China Education Green Paper). (2000). Beijing: Education and Science Press: 12.

¹⁰Decision on Improving the Development and Reform of Vocational Education. (2002). *Guangming Daily*, Sep. 25, 2002.

¹¹Yu zhijing, etc. (2016). *Tranferring from a Great Nation to a Powerful Nation of Technical and Vocational Education*. Technical and Vocational Education. 2016(6): 11.

Ministry of Education. Its tasks are: Managing general and adult secondary vocational credential education and adult cultural and technical education, drawing up major catalogues and teaching guidance documents for secondary vocational education, drawing up teaching evaluation standards, guiding the work of implementation, guiding the teaching reform and web-delivery of teaching materials, guiding the running of vocational schools established by social forces, and guiding the work of vocational certificates examinations. Meanwhile, the country has issued a series of laws and policies according to the development situation and problems of vocational education. Twenty-nine provinces, autonomous regions, municipalities and relative departments have drawn up and issued local policies and documents to implement the Vocational Education Law of the People's Republic of China.

1.2.2.3 Cultivation of Technical and Vocational Education Teachers

Teachers of technical and vocational education in China are mainly cultivated by colleges and universities. From 1989 to 2007, more than 160 universities have set up normal education departments, majors or classes of vocational education. The number of in-school students is 21,000. Technical and vocational education teachers' technical colleges were set up with 14 training bases, and more than 200 technical and vocational education teachers' development and training bases have been established. In addition, there are about 100 secondary vocational teachers' training bases which basically meet the needs of cultivating vocational teachers. In order to improve the overall quality of technical and vocational education teachers, 50 national teachers training centers are being built. Through developing various kinds of in-service training (such as courses of study for bachelor and master degrees, participation in short-term training classes, internship programs, and so on), the teacher's level of academic credential, teaching and comprehensive quality can be improved.

More attention will be paid to faculty training. The document issued by the Ministry of Education and the Ministry of Finance on Plans to Implement Quality Improvement of Faculty in Vocational Colleges (2017–2020), the quality of faculty will be improved from the following three aspects: the first is to set examples of training mode (study on the ability of pioneer teachers, training of professional skills of instructor-engineer teachers, on-the-job training of excellent young teachers and seminars specially designed for excellent principals, etc.). The next is cooperative promotion for teachers of secondary and higher vocational education (cooperative study of teachers of introductory courses and advised ones of secondary vocational schools and vocational colleges, inheritance and creation of techniques of the fields lack of teachers, building of professional teams of backbone training). The third is two-way communication and cooperation of schools and enterprises (teachers are assigned to enterprises and special appointment for part-time faculty).

1.2.2.4 Raising Funds Through Various Ways

In order to solve the problem of technical and vocational education funds, the country encourages people to raise funds through various ways to develop vocational education. The sources of technical and vocational education funds are: Government, enterprises, social groups and individuals. The input from governments is mainly used to establish and manage vocational schools and vocational training institutes. According to the Decision on Improving the Development and Reform of Vocational Education, the quantity of city education funds used in technical and vocational education should be higher than 15%. In areas where nine-year compulsory education has been popularized, it should be higher than 20%. The funds are mainly used for the renewal of equipment and towards the improvement of school conditions.¹² The central government increased the special funds for technical and vocational education to give training to technical and vocational education teachers in rural and western areas, for curriculum and textbook development, for building multi-media education resources and to establish model vocational schools. Local governments also increased the technical and vocational education special funds. According to the Vocational Education Law of the People's Republic of China, enterprises should carry out technical and vocational education and worker's training at their own cost. The cost of the training funds from general enterprises is based upon each worker at the rate of 1.5% of a worker's wage. While in enterprises which have higher requirements placed upon workers, and because their training task is heavier and the cost effectiveness is better, the training funds can be increased to 2.5% of a worker's wage. The funds should be listed in their costs. Students of vocational schools who are not in the compulsory education stage should pay their own tuition fees. Meanwhile, the country encourages enterprises, institutions, social groups, other social organizations and individuals to make donations. From fall semester of 2012, students in secondary vocational schools began to enjoy free tuition policy, including students in the country (including counties and towns), students in the city majoring in agriculture and those from families of financial difficulty.¹³ The Decision on Accelerating the Development of Modern Vocational Education issued by the State Council in 2014 stipulated that the rate of local additional charges used in technical and vocational education should not be less than 30%.¹⁴

¹²Decision on Improving the Development and Reform of Vocational Education. (2002). *Guangming Daily*, Sep.25, 2002.

¹³China Education Yearbook 2013: 211.

¹⁴The State Council. The Decision on Accelerating the Development of Modern Vocational Education. *Guofa* (2014) No. 19. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_1778/201406/170691.html. 2016-10-12.

1.2.2.5 Technical and Vocational Education in Rural and Western Areas

When developing vocational education, our country insists on the principle of proceeding from reality, by planning according to the local conditions, while designing and guiding curricula according to the needs of different areas. The percentage of the rural population is 70.1% of the total population. Employees of the primary industry are 340 million, which accounts for 49.9% of the total employees in China. Rural technical and vocational education is the key point of vocational education. A special characteristic of the educational reform in rural areas is the combination of agriculture, science and education in planning the three types of education (basic education, vocational education, along with adult education). The forms of running a school are: Multi-functional technical and vocational education centers, a combination of agriculture, science and education, combination of production and education. At the end of 10th Five-year Plan, the rural students enrolled in secondary vocational school were 3.5 million, and the students of western areas enrolled were 1.2 million. These schools cultivated practical talents for rural and western areas.

In respect to training programs of farm workers, in the past ten years, vocational education and training have trained over 20 million farm workers each year, the accumulated number of new farm workers is more than 40 million, these workers find jobs in cities after completing vocational training. Training projects to cultivate new occupational farm workers were also launched, mainly aiming at such fields as manufacturing, professional skills and social service. In 2015, the training number totaled 1 million.¹⁵

1.2.3 Problems with the Development of Technical and Vocational Education

China has a vast territory with unbalanced regional economic development, which is reflected in vocational education, mainly unbalanced development in economically developed areas and less developed area, as well as the huge gap in learning conditions between vocational institutions in rural and western areas and those in eastern and urban areas. Besides the unbalanced development, one of the most critical problems is the negative impact of traditional idea influenced by Confucian culture, that is, vocational education is usually considered as “second-class education”. In recent years, with the popularization of higher education, many people still hold the idea that technical and vocational education is inferior in education. Although much has been done to attain the achievements in the past years, problems influencing the development of technical and vocational education still exist, which can be listed as follows:

¹⁵Yu zhijing, etc. (2016). *Tranferring from a Great Nation to a Powerful Nation of Technical and Vocational Education*. Technical and Vocational Education. 2016(6): 13.

The first problem is the administration mode. Technical and vocational education is administered by Ministry of Education and Ministry of Human Resources and Social Security of the People's Republic of China, which could easily result in different policies in practice, difficulties in coordination and the waste of resources. Sometimes, the system contradiction can cause the disconnection between school education and relevant standard requirements of occupational qualification.

Secondly, the lack of funds. Technical and vocational education needs more funds than general education, especially when it comes to industry sectors which require more equipment. Insufficient funds remain a key factor constraining the development of vocational education, especially the poor efforts of the local governments in implementing relevant policies, which can be seen in the following: (1) The funds spent on technical and vocational education is relatively less; (2) the budgetary in secondary vocational schools is small; (3) the financial funds for vocational colleges is remarkably less than those for universities, which is out of proportion to their scale and roles in higher education.

Thirdly, the insufficient participation of enterprises. Studies show that most enterprises are unwilling to participate in the teaching activities and operational management of vocational education. The entrepreneurs complain about the low quality of human resource yet grudge their input in vocational training. Many enterprises regard skilled workers as physical labor force instead of human resource, lacking good enterprise culture to encourage the potentials and enthusiasm of employees, which affects vocational education to certain extent.

Fourthly, separation of learning from practice. Many vocational institutions fail to give enough consideration to the demand of enterprises and the law of career development in teaching-learning process, resulting in the separation of learning from practice. Graduates cannot satisfy the needs of enterprises in a short period of time, even though their jobs match their training programs.

Last but not the least, technical and vocational institutions undertake small amount of short-term trainings, the chances of active participation in training market is slim, it's mainly because: (1) learning conditions are not in line with the requirements of enterprises; (2) vocational institutions have little connection with enterprises; (3) vocational institutions are not active and initiative enough in developing training measures to serve local economy and social development.

Faced with different kinds of problems, it's urgent that an effective mechanism with corresponding legal guarantee and system support be established.

1.2.4 Reform Tendency of Technical and Vocational Education

At the beginning of the 21st century, three documents were issued, including the Decision on Improving the Reform and Development of Vocational Education (2002), the Decision on Improving the Implementation of Vocational Qualification Certificate

System in Vocational Schools (2005), and the Decision on Giving Place to Industries and Enterprises in Technical and Vocational Education and Training (2005), lay down the policies and indicate the direction of the reformation for the future development of technical and vocational education in China. The main contents of these documents are as follows.

First, define the new target for technical and vocational education development—constructing a modern technical and vocational education system which is closely related to employment, reasonably structured, flexible and open, unique and independent. There are two aspects, one is to establish a close relationship between technical and vocational education and social development. In other words, development of technical and vocational education should be related to the reform of economic system. The adjustments of the industrial structure and the change in employment mode will turn the employment needs into technical and vocational education needs. The second aspect is to highlighting the characteristics of vocational education, namely reasonably structured, flexible and open, unique and independent.

“Reasonably structured” means that the major structure, level structure and area structure of technical and vocational education should meet the needs of the changing society and economic development. “Flexible and open” means that technical and vocational education should be community-oriented and market-adapted. For this, it is necessary to establish a flexible schooling, adopt various modes of running the school, to form an open system for vocational education. “Unique” means that technical and vocational education should emphasize practical teaching to foster students’ practical abilities. “Independent” means that vocational schools should adjust themselves to the changing markets and social needs. It also means enlarging the autonomy of the school, strengthening its management ability in order to promote further development.

Secondly, deepen the reform of the technical and vocational education management system by establishing and improving the managerial system of management from level to level, that is locally dominated, government planned and society joined.

The innovation of a technical and vocational education management system will be mainly reflected in the following aspects. First, under the leadership of the State Council, promote the joint meeting of various departments within vocational education. Through the cooperation of each department, manage and solve the policy problems, in order to realize the development of vocational education. It will help to optimize vocational resources, and change the former situation of a closed and redundant system of managing a school which brought about a low level of efficiency. Secondly, strengthen the responsibility of local governments for technical and vocational education development, especially the planning responsibility of city governments. According to the Vocational Education Law of the People’s Republic of China, the local governments are the ones who should shoulder the main responsibility for the local economic and social development. The local government determines and manages the local technical and vocational education development programs. With the adjustment of economic structure, a rapid expansion of the local economy is likely and planning the technical and vocational education locally will improve the relationship between technical and vocational education and local economic development.

The following four steps will strengthen the local governments' process of planning for vocational education: (1) Manpower planning. The scale, structure and development should be suited to the needs of the local social and economic development; vocational education and other kinds of education should develop in a spirit of cooperation. (2) Plan schools as a whole. While insisting on developing vocational education, the government should plan, coordinate and support industrial organizations, enterprises, and social forces to run technical and vocational education schools. (3) Plan the resources. Break the department-school boundaries in order to fully utilize current resources, and optimize the schools' layout and structure according to the needs of the local economic development. (4) Coordinate policy making and implementation. For example, coordinate the enrollment and employment systems, determine the academic majors to be offered, and determine how to raise funds and how to use them, etc. Make a policy to form a beneficial social environment for the harmonious development of technical and vocational education and social economy.

Thirdly, get the support of government and society for vocational education—forming a multiple running pattern in which the government plays the leading role, while industries and social forces are brought into full play. The innovation of the school system is the primary characteristic of the current development of vocational education. It is necessary to fully reflect the interests of government, enterprises, industrial organizations, and citizens. The leading responsibility of government is reflected in the insistence of the leading role of the government in running schools. The government should run model schools and vocational training institutes, support and guide the vocational schools, and ensure training institutes are established by industries and enterprises. Industries and enterprises are important forces in running vocational schools. Competent authorities in industry should take charge of the technical and vocational education and training of workers. Meanwhile, those authorities should bring the efforts of industrial vocational organizations into play by carrying out industry human resource prediction, along with designing industrial technical and vocational education and training plans, and carrying out teaching reform, along with printing textbooks and constructing teachers' training. Enterprises should shoulder the task of holding technical and vocational education and training. The responsibility of enterprises includes the design of technical and vocational education and training plans, strengthen the training bases, improve the whole quality of workers, optimize the structure of the workers' teams and strengthen the enterprises' competitiveness. Social forces' participation refers to the development of private education and Chinese-foreign cooperative education.

Fourthly, strengthen vocational education's ability to provide services—service for the adjustment of the economic structure and the improvement of technology; service for improving employment and reemployment; service for agriculture, the countryside and the farmers; and service for the development of western areas. These four abilities are the starting point of technical and vocational education reform and development in the new era. In order to improve the service ability of vocational education, technical and vocational education should develop majors suited to the new industries and modern service trades. Moreover, according to the new requirements for developing western areas and improving urbanization, it is necessary to

adjust the technical and vocational education structure, develop various training and services.

Fifthly, improve the innovation system of vocational education—developing technical and vocational education according to the real need of labor market resource configurations, and implementing the vocational qualification certificate system to assure the quality of education. With the improvement of the socialist market economic system, the market configuration for a system of labor resource is being built. The labor market has become an important factor in influencing technical and vocational education development. The demand of the labor market determines the scale and level of various vocational need. The dynamic change of the labor market determines that the demand of employers' quantity, quality and structure. So technical and vocational education reform and a system for labor employment should be developed and synchronized. The cultivation of schools should be closely combined with employment needs, to meet the needs of the labor market, and the students' desire of employment. The school teaching should be in line with various labor employment systems. The teaching content and activities should be in line with the demands of the labor market, and employment access standards and vocational qualifications. Vocational schools, on the one hand, and adjusting teaching content according to the needs of labor market are on the other side. Through strengthening of the employment guidance and service, they provide students with employment information and improve the connection between vocational schools and labor employment.

In order to improve the vocational qualification certificate system, three tasks have to be accomplished: First, implement the vocational qualification certificate system in vocational schools. Strengthen the connection between the school's recorded education and the vocational standards. The setting of the majors and the teaching content should be combined with market needs. Second, give play to vocational schools and training institutes in improving the vocational qualification system, by establishing vocational skill identification stations or examination institutes in vocational schools with good academic standing. Third, combine the qualification certificate requirements and school's general education requirements, to reduce redundancy in training and increase efficiency. When students apply for skill qualification under a medium degree, they can only take the operating skills examination only.

In 2010, the document National Outline for Medium and Long-term Educational Reform and Development (2010–2020) issued by the Ministry of Education proposed that to 2020, a new technical and vocational education system will have been formed, which will meet the needs of transferring of economic development and the readjust of industrial structure, life-long education will be embodied. cooperative development of modern vocational education will be formed, the public needs of receiving vocational education will be satisfied, the requirements for high-quality labor force and skilled personnel will be met. Hence, the government will lay emphasis on high quality education, mobilizing the

initiative of enterprises, accelerating the development of vocational education in the country and enhancing the attraction of vocational education.¹⁶

1.2.5 Policies and Measures Promoting Technical and Vocational Education

In the last ten years, the Chinese government published a series of policies to promote the development of technical and vocational education. According to the National Outline for Medium and Long Term Educational Reform and Development (2010–2020), developing technical and vocational education is a major approach to the development of economy and the promotion of employment. The issue of agriculture and rural areas shall be highlighted. The Decision of the State Council on Accelerating the Development of Modern Vocational Education System (State Council 2014) identifies construction of modern vocational education system as an important initiative to promote the innovation in technical and vocational education. These documents deploy the policy and reform direction for the future development of vocational education.

Measures should be taken to develop technical and vocational education. (1) Define the new target. It is of great significant to define a new target, that is, to construct a modern technical and vocational education system which is relative to the employment. On the one hand, to establish a close relationship between the development of technical and vocational education and social development. That means, technical and vocational education should be related to economic development and industry reconstruction; on the other hand, to enable technical and vocational education arrangement and structure to be structured in a reasonable way, making it flexible, open, unique and independent. The structure, levels and contents of technical and vocational education at secondary and tertiary levels should meet the needs of the change of the society and economy. It is necessary to establish flexible schooling, adopt various running modes to form an open system for technical and vocational education. (2) Reform technical and vocational education management system. The managing form of vocational education should be shaped into a style which the central government planned, the local government implemented and social parties participate in. Establishing a joint meeting system between administrative departments. Through the cooperation of different departments, it is beneficial to strengthen the governance impact, improving the efficiency of resources in technical and vocational education, realizing the unity of the development of technical and vocational education, social and economic development. Strengthening the responsibility of local governments for technical and vocational education, especially the planning and coordination responsibility of governments at city level. With the reconstruc-

¹⁶Ministry of Education of the People's Republic of China. National Medium and Long-term Educational Reform and Development Program (2010–2020)[EB/OL]. http://www.moe.gov.cn/jyb_xwfb/s6052/moe_838/201008/t20100802_93704.html, 2010-07-29:21.

tion of economy, the competence of local governments for technical and vocational education should be strengthened. (3) Co-support of the government and the society. The technical and vocational education system should reflect the interests of government, enterprises, industrial organization and citizens. The government runs model vocational institutions, supports and guides vocational institutions established by industries. Authorities at different levels carry out human resource prediction, design plans for human resource, carry out teaching reform and further training of teachers. The responsibility of enterprises lays on the design of training plans, strengthen the training facilities, carry out job training, improve the qualification of staff and strengthen the enterprises' competitiveness. (4) Strengthen possibility to provide service. The possibility to provide service of technical and vocational education should be improved. According to the new requirements of the optimization and upgrade of industry structure upon professional knowledge and skills, technical and vocational education institutions should develop training programs facing new needs of industries and modern service trades, in order to change the situation in which qualified and skilled workers take up low percentage among employees. It is also necessary to adjust the technical and vocational education structure, develop new type of training services in rural and western areas into multi-functional and comprehensive service body to improve the development and urbanization in western regions.

1.3 Technical and Vocational Education in Hong Kong, China

High quality, talented workers are the most valuable treasure among all resources. It is especially important to Hong Kong, which is a city with few resources, little territory, and a high-density population. Since the 1960s, the economy of Hong Kong has experienced a period of rapid growth. Among the various reasons for their success, technical and vocational education is an important factor. Hong Kong's vast and effective technical and vocational education system has cultivated three million workers with high quality training.

1.3.1 Current Situation of Technical and Vocational Education

1.3.1.1 System

Technical and vocational education in Hong Kong rose with the development of its economy. After World War II, Hong Kong developed into a re-export port city. In the 1960s, its export-driven economy developed rapidly. Soon after the 1970s, not only did manufacturing and foreign trade expand, but also the tertiary industries like

finance, real estate and tourism developed rapidly. From the middle of the 1960s, in order to win in the fierce international economic competition, industries adopted advanced equipment and modern management ideas. In such a situation, related departments and employers were conscious that the lack of high quality employees and managing personnel had become an obstacle in the development of the economy. Since 1965, every two years, the government has carried out investigations to learn about the current situation for labor demands, to explore the issues of the labor movement, and to put forward reports and to provide guidance for the development of vocational education. The investigation of the late 1960s showed that though at the end of the 1940s and at the beginning of the 1950s, Hong Kong had introduced some management and technical talents from the mainland and other Southeast Asia countries. As a whole, the quality of labor was still low. Universities in Hong Kong put emphasis on cultivating high-level talents. Hence the lack of medium and primary technicians and workers has seriously affected economic development. Faced with this situation, the decision-making departments were determined to develop a technical and vocational education system that cultivated scientific talents at various levels, especially where the secondary and primary technicians could be improved. In 1973, the Hong Kong government established a training department to provide consultation for technical and vocational education and training. In order to meet the needs of technical and vocational education and training, in 1982, the government issued the Vocational Training Council Ordinance, and established the Vocational Training Council (VTC), which was set up with the mandate to provide and promote a cost-effective and comprehensive system of Vocational and Technical Education to meet the needs of the economy of Hong Kong. Vocational Training Council (VTC) is the main policy-making and development institution for Vocational and Technical Education in Hong Kong. It is a statutory body that advises government on the measure to assure a comprehensive TVET system. The Council itself has eighteen non-government members including representatives of the education, industry, commerce, service and labor sectors and three government officials: the Commissioner for labor, the Directorate-General of Trade and Industry and the Deputy Secretary for Education.

The length of schooling in a primary school is five years, and in secondary school it is seven years. The five-year primary school and the first three years of the secondary school are compulsory. After grade three of secondary school, students have to be selected. The technical and vocational education in Hong Kong is divided into three qualifications and educational levels, they are mechanics, technical personnel and technicians. The secondary technical and vocational education cultivates mechanics and technical personnel, while higher technical and vocational education cultivate technicians.

Organizationally, technical and vocational education is divided into two kinds: Full-time and part-time. Full-time courses provide various pre-job education and training. Graduates of junior middle schools can apply for the one-year full-time study, the funds for which will be supplied by the government. Students can take up jobs after graduation. During the working period, students can do further studies in colleges of science and technology belonging to Vocational Training Council (VTC).

Thus students can find the proper development direction for themselves in various fields of education that are mutually connected. Full-time students who have taken part in pre-job training spend one day a week in learning theory in colleges of science and technology. They spend four days a week practicing in training centers according to different major's requirements. The resources of schools which belong to VTC can be shared. Part-time courses provide theory and practice according to different majors. They also offer some higher certification classes. The students in these classes are allowed to practice in industrial and commercial institutes, or hold program exchanges and enrollment into classes to enlarge students' vision, and cultivate the students' ability for independent thinking and judgment. There are several types of part-time courses, such as selective training system, night school system and short-term system, and the school time is quite flexible. It is designed for in-service employees who want to improve their knowledge and skills. Selective training system means that employees are allowed to take part in VTC's vocational training while they're employed. Selective training system can be divided into daytime vocational system (one to two days a week) and a period of time vocation. No matter which system, students receive the same qualification certificate or diploma provided they earn enough credits.

Up to now, a pyramid system of technical and vocational education has been formed. The system is made up of two parts: Pre-job education and in-service education. The pre-job education is the main part. Organizations carrying out technical and vocational education can be divided into two kinds: Public and private. Public schools are run by the government. They offer graduates of grade three from high school and employees full-time, part-time and amateur training courses. They also provide post training for employees of big enterprises. Private schools are run by individuals. They offer high school graduates full-time and amateur vocational technical training courses.

Recently, the Vocational Training Council (VTC) has drawn the Third Eight-year Strategic Plan (2015/16–2022/23) which articulates core strategies in shaping and steering the growth of Vocational and Technical Education. This Plan points out the following strategic priorities for Vocational and Technical Education: (1) Promotion of the value of vocational and professional education and training to the community at large; (2) Formulating a master plan for the development of VTC's campuses and facilities; (3) Enhancing articulation opportunities for vocational and professional education and training students, with a view to providing seamless progression pathways from secondary to higher education level; (4) Introduction of a new model of apprenticeship training (Earn and Learn Pilot Scheme) to attract young people to join industries with a keen demand of labor; (5) Strengthening the recognition of vocational and professional education and training qualifications for employment and professional practices and bringing closer alignment of vocational and professional education and training services to the industries.¹⁷

¹⁷Education Bureau of the Government of the Hong Kong Special Administrative Region (2012). Vocational Education. Hong Kong: Government of the Hong Kong. Accessed: 16 September 2013. Vocational Training Council (2016). Strategic Plan. Accessed: 21 January 2016.

1.3.1.2 Curriculum

In order to enhance the employees' ability to apply what they learn, enterprises in Hong Kong set training course according to social needs rather than fixed modes. All courses are examined by experts to make sure that the courses reach the requirements of industries and enterprises. Since the courses are set according to industry needs and after taking into account the real market demand, the teaching can be closely connected to the reality. Production and teaching are combined so that the students can apply what they have learnt. From an overall perspective, the productive technology is not a work-class, but it pays attention to practice and efficiency. The employment market in Hong Kong needs a great number of operators and service personnel, so the emphasis of technical and vocational education is on technician courses. They mainly cultivate technicians and service workers.

Similar to the mainland China, technical and vocational education in Hong Kong also has culture courses and social workers courses, but they constitute only less than 30% of the curriculum. In teaching professional courses, the practical courses constitute more than 50% of the total courses. They emphasize simulation teaching, working on the similarity between practice areas and the actual working environment. So students who have received special training will be ready to operate independently as soon as they go to work; except for some special types of work, they don't need apprenticeship. Simplifying theory and emphasizing practice is an important reason for the success of technical and vocational education in Hong Kong.

1.3.1.3 Major Setting

Technical and vocational education in Hong Kong develops the needed majors according to the supply and demand of the labor market. Take secondary technical and vocational education as an example. Since 1970, eight industrial colleges have been established. They were Morrison Hill Industrial College (1970), Kuiyong Industrial College (1975), Guantang Industrial College (1975), Huang Kejin Industrial College (1977), Li Huili Industrial College (1979), Dunmen Industrial College (1986), Shatian Industrial College (1986), and the Caiwan Industrial College (1987). Together with industrial high schools and two colleges of science and technology, they form Hong Kong's technical and vocational education system. The eight industrial colleges have 15 majors, such as, applied science, tailoring, commercial computer, construction, design, electrical and electronic engineering, art, science and engineering, hotel management, tourism, industrial technology, turbine and structure, mechanical engineering, automotive engineering, painting and textile. The objective is to cultivate technicians and technical workers, clerks, directors and secondary managers.

Currently, Vocational and Technical education in Hong Kong is offered at post-secondary level and is provided by the following institutions, all of which are established under the authority of the Vocational Training Council (VTC):

- Hong Kong Institute of Vocational Education (IVE);
- Hong Kong Design Institute (HKDI);
- Technological and Higher Education Institute of Hong Kong (Thei);
- Shine Skills Centre (Shine);
- Pro-Act by VCT (ProAct);
- International Culinary Institute (ICI);
- Integrated Vocational Development Centre (IVDC);
- Youth College (YC);
- Hotel and Tourism Institute (HTI);
- Hospitality Industry Training & Development Centre (HITDC);
- Chinese Cuisine Training Institute (CCTI);
- Maritime Services Training Institute (MSTI);
- Institute of Professional Education and Knowledge (PEAK).

The Hong Kong Institute of Vocational Education (IVE) offers courses in the following nine disciplines: applied science, business administration, child education and community services, construction, design, printing, textiles and clothing, electrical and electronic engineering, hotel, service and tourism studies, information technology and mechanical, manufacturing and industrial engineering.

The Hong Kong Design Institute (HKID) was established in 2006 with the aim to bring together design-related courses from IVE (Sha Tin Campus), IVE (Kwai Chubg Campus), IVE (Kwun Tong Campus) and IVE (Tsing Yi Campus). It offers contemporary design courses from foundation to higher diploma levels.

The School of Business and Information Systems (SBI) has started to operate in 2001. It runs Higher Diploma programs for self-funded students. Since the academic year 2004–2005, the SBI has also been offering programs under the framework of Project Yi Jin (PYJ) launched by the Government. The project targets secondary school leavers (in particular from grade five) and adult learners (twenty-one years old or older). The project aims to: (1) Provide an alternate pathway for secondary school leavers and adult learners to pursue continuing education; (2) Help build a firm foundation of knowledge and skills for work and further study in students by providing training in languages and application of Information Technology; (3) Foster the concept of lifelong learning; and (4) Enhance the quality and the competitiveness of the human resource.

The Youth College (YC) was established in 2004. It aims to provide progression pathways for secondary school leavers (in particular from grade three to five) and help them acquire knowledge and skills necessary for further studies or employment.

In addition, the Vocational Training Council (VTC) has training and development centres that offer basic skills training programs and upgrading training courses in: automobile, electrical, electronic, gas, jewelry, machine shop and metal working, maritime services, plastics and tooling technologies, printing, textile and welding industries. The range of the level of courses varies from operative to technologist.¹⁸

¹⁸Education Bureau of the Government of the Hong Kong Special Administrative Region (2012). Vocational Education. Hong Kong: The Government of the Hong Kong. Accessed: 16 September 2013.

As to higher vocational education, there are two colleges: Hong Kong Polytechnic University and City Polytechnic University of Hong Kong. There are seven departments and three schools in Hong Kong Polytechnic University. They are the departments of applied science and textile, commerce and management, architecture and land development, engineering, medicine and social science, math and electronic computing, Chinese, and the schools of textile and clothes making, medical service and Taigu design. There are ten departments in City Polytechnic University of Hong Kong. They are: Accounting, architecture, commerce, management, computer, electronic engineering, Chinese, math, science, and social administration. The above two universities cultivate applied higher scientific, technological and management talents as technicians, engineers and managers.

1.3.1.4 Teaching

Because of certain historical reasons, the teaching mode of technical and vocational education in Hong Kong has been greatly influenced by western education. Teaching of technical and vocational education is always the combination of classroom teaching and apprenticeship. There are also some other teaching modes, like symposium, case study, experiment, factory practice, on-the-spot investigation and exercises. The teaching pays attention to the students' creativity, problem-solving capacity and analytical ability.

As to the teaching method, most teachers are able to use various modern media and equipment in their teaching. Technical and vocational schools in Hong Kong have advanced educational equipment. Some equipment is more advanced than the ones used in enterprises. This is beneficial for the advancement of technology training, and helps to avoid the situation in which training may lag behind technology. The investment of equipment is usually supported by the government or enterprises. In some cases, schools rent equipment from enterprises. As to the teaching organization, most schools prefer the small class. A teacher has, as a rule, only 15 students in a class. During the course of the lessons, the teacher and students ask and answer questions as equals. Besides that, the teachers train students in a strict way while paying attention to being practical, standardized, accurate and being skillful. As to teaching materials, they are not limited to one format, but make up these materials according to the traits of the fields and the development of science. They constantly revise the contents of the books and improve equipment so that students get the latest knowledge in the field and do not lag behind.

1.3.1.5 Faculty

There are many excellent teachers in the technical and vocational schools in Hong Kong. With the rapid development of modern technology, enterprises are changing constantly. Consequently, technical and vocational education asks for suitably trained teachers of quality. In order to meet the challenge technical and vocational schools

engage teachers from enterprises. Those who are engaged earn high salaries, but have to shoulder great responsibilities. Their jobs include designing skill training, revising textbooks, producing practical and experimental equipment, and constructing labs. Each school has its own way of choosing and managing teachers. Currently, some industrial schools have carried out new ways of teaching and management, which is to have famous people from the industry and commerce circuit to join, design and organize the teaching work. So the number of part-time teachers keeps increasing.

1.3.1.6 Management

The Hong Kong SAR Government pursues the principle of “active but not interfering”. The government won’t use administrative measures to interfere in marketing schooling, but it has the right to review and supervise the registration of schools and institutes. It acts as the guide, supervisor, service provider and supporter. By establishing related institutes, designing a series of regulations and ordinances, the government works hard to develop vocational education. For example, workers of a certain level have to receive corresponding technical and vocational education and acquire certain certificates and diplomas. The teacher’s promotion and salary raise are always related to academic credentials and diplomas. It helps to stimulate the development of vocational education.

The Vocational Training Council (VTC) set up in 1982 has an Executive Director who sits on the council as ex-officio member. The work of the Council is supported by five functional committees, twenty-one training boards and five general committees. The purpose of the training boards is to advise on the manpower and training needs of various industries or commercial sectors and recommend on the best approaches to meet these needs. General committees are responsible for specific training areas that can be applied to more than one sector of the economy. These areas are: apprenticeship and trade testing, information technology training and development, management and supervisory training, technologist training, and vocational training for people with disabilities.¹⁹

The Vocational Training Bureau and the Employer Re-training Bureau are two institutes, they take charge of vocational the education and training. The Vocational Education Bureau mainly takes charge of providing consultation to the government, designing measures, amplifying industrial education and training systems, assisting students’ studies, and employment. The Employer Re-training Bureau takes charge of providing training to people who have no jobs or lack employment, and helping them to transfer to new occupations. Through 55 recognized technical and vocational training and adult education institutes, the Employer Re-training Bureau provides various vocational training courses to people who need to be trained. As to the public institutes, the government gives them full support. The funds of the Vocational

¹⁹Education Bureau of the Government of the Hong Kong Special Administrative Region (2012). Vocational Education. Hong Kong: The Government of the Hong Kong. Accessed: 16 September 2013.

Training Bureau come from the government. Between 1994 and 1995, the expenditure for public education was HK\$26,921 million, of which 5% was used to provide vocational, industrial and technical educational courses. Tuition fees are low for students in vocational schools, the tuition for full-time technicians is HK\$300 per year. The tuition for full-time skilled workers is HK\$180 per year, and the tuition for night school is between HK\$100 and HK\$200. Today, many channels are available for education funds, besides the investment from the government, social donations are encouraged. Students who have financial difficulties can apply for relief. Besides, there are various scholarships, life allowances and grants.

1.3.2 Characteristics of Technical and Vocational Education

1.3.2.1 Close Connection with Labor Market

One of the prominent characteristics of Hong Kong's technical and vocational education is that it considers the labor market demand as the guide. Since all the graduates have to seek jobs by themselves, the majors have to be set according to market demands. It helps to improve production and also helps students to find jobs quickly. The enrollment plan and curriculum development of technical and vocational education institutes are designed according to the needs of labor market. The 15 subjects in the eight industrial colleges are all urgently demanded. Each subject is subdivided into several majors to meet the needs of different industries and trades. As a whole, Hong Kong's technical and vocational education is efficient and practical. Public and private institutes have high autonomy. The government won't interfere in school activities and that helps the institutes to adapt to the changes of the labor market.

1.3.2.2 Practical and Effective Teaching Methods

Hong Kong's technical and vocational education absorbs western and eastern advantages. It preserves the tradition of applying what one learns, and introduces advanced western teaching methods. It combines theoretical and applied skills learning, to create a real situation in which students can be trained. It emphasizes the combination of teaching theory and practice, training students how to respond in real situations. The time spent on practice is more than on classroom teaching. The teaching situation and the real working situation are similar. The learning process is the practicing process so that the theory and practice are connected. This teaching method where emphasis is given to practice and effectiveness avoids dullness during the learning process, and sharpens the students' real working ability. Since the teaching environment is similar to real working environment, the skills students acquire are identical to the market demands. Emphasizing tradition, striving to reform and innovate, respecting principle and not sticking to one pattern are important factors in the success of technical and vocational education in Hong Kong.

1.3.2.3 Standard Management of Technical and Vocational Education

The Hong Kong SAR Government does not interfere in social schooling, but that does not mean it is not concerned about education. In fact, the government has great influence upon vocational education. By regulation and financial support, the government guides the schooling at a macro level and encourages various industries to support education. The law is an important factor in standardizing and managing education. Hong Kong has a large and perfect system of educational laws whose content is concrete and easy to apply. Financial support is another tool for the government's education management. The teaching and training institutes of technical and vocational education is supported by the government, enterprises, and society. The various industries provide consultation to help form decisions. Enough educational input provides good schooling conditions for technical and vocational education and training. The government inputs about HK\$300 million into technical and vocational education annually, but its percentage of educational expenditure is still lower than that of developed western countries, even lower than that of Korea, Chinese Taiwan and Singapore. But the Hong Kong SAR Government is a well-known financier and makes each penny play its full role. The government does not give financial support to private schools, while public schools are supported by the government and the supervision of funds is strict.

1.3.2.4 Modernization of School Management Modes

The market mechanism plays a decisive role in the assignment of technical and vocational education resources. No institute can own and use a resource without a price, and the resources should be fully used to bring the greatest benefit. So the institutes' management modes are modernized. It is reflected in the following three aspects. First, the institutes are simplified, with less managerial personnel, more part-time teachers, and the teaching places are rented. Secondly, the institutes' service awareness is strong. Where there is a new community, there is a teaching agency. The big institutes' advantage is quite clear. Those institutes usually have several teaching locations which are scattered in different communities. They form a vast technical and vocational education network system of unified decisions, centralized management, decentralized operations, and independent accounting. This has great advantage in market competition. Thirdly, the schooling modes are flexible. One institute can offer various courses, from specified technical and vocational education to adult training, from full-time to night school, from courses of knowledge and skill to courses for entertainment and life.

1.3.2.5 Modernization of Teaching Methods

The prosperous economy of Hong Kong provides a strong basis for the modernization of teaching installations and the teaching methods of vocational education. Each

industrial college or industrial training center has its own experimental factories and workshops. The teaching and training equipment is advanced, complete, and reaches the standard found in the same industrial trade. In training centers and schools held by the government, traditional classrooms with desks and chairs are rare. However, almost all classrooms are equipped with computers. Each school desk has one computer connected to the teacher's computer; teachers use computers to show teaching outlines and important contents, and to assign homework, analyze and answer questions, and the students use computers to record and consult materials.

1.4 Technical and Vocational Education in Macao, China

In Macao, the government seldom interferes in the making of educational policy. It has almost given up the right of leading education, and education has become the domain of non-governmental organizations. So education in Macao mainly depends on non-governmental and social groups. Various groups like churches, labor unions, trade unions, community unions, women's unions and the association of fellow provincials have become the main bodies for running education. A peculiar characteristic of Macao's education is the diversity of schooling it allows. On the basis of language, there are Chinese schooling, Portuguese schooling, and English schooling options. On the basis of term length and curriculum arrangement, there are mainland schooling, Chinese Taiwan schooling, Portugal schooling, and England schooling options. Among all these 76% of the schools offered Chinese education between 1993 and 1994, but 86% of the students received a Chinese education which is the majority of the students (Gu and Wu 1999).²⁰ This shows that though Portugal governed Macao for a long time, the Chinese culture still occupies the leading position there. Chinese have a deep attachment towards traditional culture. Though the co-existence of different educational systems and the self-management of different schools are not helpful to the development of education, it virtually improves the multicultural pattern of Macao education.

1.4.1 Current Situation of Technical and Vocational Education

1.4.1.1 Secondary Technical and Vocational Education

The target of secondary technical and vocational education in Macao is to cultivate secondary technicians. The Macao Educational System issued on March 29, 1991 stipulates: "Teenagers and adults who have finished junior high school education have to receive technical and vocational education." The length of technical and

²⁰Gu Longsheng, Wu Xuesheng (1999). *Macro Manual*. Zhengzhou: Henan People's Press: 103.

vocational education ranges from two to three years. Students who have finished junior high school courses of technical and vocational education can receive a junior high school course diploma and primary specified technical certificate. Students who have finished senior high school courses of technical and vocational education can receive a senior high school course diploma and specified technical qualification certificate. Graduates of vocational high schools can either find jobs in the labor market or go on to further their education in higher schools, especially in schools of science and technology. Owing to the population and geography of Macao, there are only five secondary vocational schools: Ciyou High School, Leimingdao Church Memory School, Sanyu High School, Macao Industrial Union Vocational School, and Chinese and Portugal High School. What is more, the development of these schools is uneven and unbalanced. For example, in 1988–1989, Ciyou High School had 546 students, while Leimingdao Church Memory School had only 50 students.

Generally speaking, the scale of regular technical and vocational education in Macao is small. Leimingdao Church Memory School closed in the late 1980s and the beginning of the 1990s, though it opened to provide technical and vocational education courses later, it enrolled a limited number of students, about 50 per year. It is clear that technical and vocational education in Macao is weak. The main reason is that over a long period of time, the Macao SAR Government did not plan or invest in secondary technical and vocational education system. The current regular secondary vocational schools were established by social groups or churches. The government did not play a leading role in the development of vocational education.

Generally, the curriculum is expected to meet the needs of the society. The main courses in technical and vocational education in the past were woodworking, metalworking, engineering and car repairing. With the development of a modern economy along with science and technology, the above courses became less important. Though those courses are still reserved in vocational schools, they are considered as part of a technical education. Some courses like tailoring and household management only provide female students with a household education. In contrast, today, computer technology has been widely applied in vocational schools. The current curriculum setting is closely related to the economic development, for example, the following career skills are taught: Secretarial practice, commerce, computer, typing, accounting, finance and economics. These curricula are welcomed by the students, and they offer students more employment opportunities.

Taking the curriculum in the Chinese and Portugal High School as an example, from 1998 to 1999, there were six classes in the junior department, while in the senior department there were day classes and night classes. The day class section of the senior department had one class in computers and one class in tourism. The night class section had two classes in commerce, one class in industry, one class in computers and one class in social service. The junior department of the Chinese and Portugal High School mainly provides general education, but there were also some vocational courses. As a whole, it looked much like vocational education. The curriculum of the senior department was similar to that of the junior department. In the first two grades, the general education courses were the majority, as there were less vocational courses. In the third grade, the school arranged for one year practice, the specified

technique and practice were concrete and practical. This kind of curriculum setting could both help students acquire knowledge of general education and at the same time give them an advantage when they enter the labor market.

1.4.1.2 Higher Technical and Vocational Education

There was no higher technical and vocational education in Macao in the past. A higher education was only possible outside of Macao until 1981, when some Hong Kong businessmen established the East Asia University in Macao, which was the predecessor of Macao University. After that, the government established the Macao Science and Engineering College, and the Macao Security Army High School. Thus forming the higher educational system in Macao. This enabled the most urgently required talents to be cultivated in Macao. At the beginning, when Macao University was established, there were three colleges: Undergraduate College, Science College, and the Science and Engineering College. At that time, the Science and Engineering college mainly provided professional training courses, which were the same as higher technical and vocational education. Macao Higher Police School and Tourism Higher School were established in the 1990s. In 1995, Tourism Higher School was changed into Tourism Training College. The Science and Technology College of Macao University mainly takes charge of teaching the higher vocational and technological talents at the undergraduate level. The schooling in these institutions is mainly of three years (six terms). Higher technical and vocational education above the level of undergraduate is usually carried out in the Science and Technology College of Macao University.

In the above universities, the Macao Science and Engineering College plays an important role in cultivating technical and vocational talents. From the school years of 1990–1991 to 1996–1997, the Macao Science and Engineering College developed quickly. The number of students increased from 648 to 4598, a seven fold increase (Ma 1999).²¹ Since the pillar industries of Macao are tertiary industries, like tourism and gambling, it was decided that increasing the majors being offered and the further development of curriculum for higher technical and vocational education in Macao was not widely needed. In the higher technical and vocational sector, such as the Macao Higher Police School and Tourism Training Colleges, the curriculums being offered are at a lower academic level. In contrast, the Macao Science and Engineering College has relatively more academic majors. Currently, the humanities and commercial courses are the main body of study, and there is a tendency that the majors opened to students are increasing yearly. Taking the Macao Science and Engineering College as an example, one can see that in the past there were only four majors: Hotel management, tourism management, computer management and social work. On the contrary, now there are 11 majors; majors like commercial management, interpretation, and airplane design have been added. Since the establishment of the Tourism

²¹Ma Zaoming (1999). The Basic Constitution of Macao Technical and Vocational Education. Education Review(5): 81–4.

Higher School, all tourism courses have been moved into it. The curriculum requirements and development for the Macao Science and Engineering College reflects the needs of the economic development in Macao.

After returning to the mainland, the Macao government paid more attention to the investment of higher vocational education, and constantly expanded the scale of higher vocational education. Macao higher education institutions have occupation of Macao Polytechnic Institute, Macao University of Science and Technology, Tourism Training Institute, Macao Security Forces College (formerly Macao Senior Officer School), Asia (Macao) International Open University, Macao Inter University Institute. Nowadays, Macao actively creates various forms of lifelong occupation technology education system, increases investment. In 2007–2008 academic year, a total of \$272 million was invested to expand the scale of vocational education, the number of schools and students increased greatly, with 3941 in-school students in Macao Vocational College. It cooperated with the Zhongshan University and Hongkong University in training talents, supported local colleges and universities to promote high-tech courses, etc.

1.4.1.3 Vocational Training

Though there are not many regular vocational schools in Macao, there are many institutes carrying out vocational training. These institutes are mainly night schools. There are many courses, including language, finance, industry, tourism, transportation, law, computer, art, architecture, food and drink, and commerce. The training programs are flexible and mostly of short-term duration. They are arranged according to the needs of the labor market and the economy. In the past, the educational level of Macao citizens was low. Most workers had only received a primary school education. In view of this situation, the Economic Department in Macao's government established several technical and vocational education centers in 1983, offering industrial and commercial courses like accounting, secretarial practice, and computer education. Young people who are older than 15 years, employed or are going to be employed, and had received a junior high school education can receive the training. The aim of vocational training is to make sure that laborers have the basic ability to do certain work. There are four modes: Pre-work training, special training, in-service training and transference training. Currently, vocational training in Macao is mainly run by the Department of Education, and public and private institutes. They enroll teenagers or adults who have finished their primary school education.

The Department of Education and Youth plays a leading role in vocational training. Between 1991 and 1997, the Department of Education and Youth trained 2838 people, while public and private institutes trained only 1620 people. In various training courses offered by the Department of Education and Youth, computer and commerce had the most takers with 734 and 626 trainees respectively. In contrast only 339 people received art training. At the same time, the scale of vocational training offered by public and private institutes was much wider, with some 20 kinds of majors

and courses (Feng 1999).²² For example, during the academic year from 1996 to 1997, many courses were offered: Computer drawing, electronics, architecture, and drafting, property management agent and Chinese operator. Since the management of public and private institutes is flexible, their majors and courses can respond quickly to market demands. They can open some short-term training classes according to the market needs, for example, elementary hair dressing assistant, typing, accounting and electronics. Some new majors, like computer graphics and property management agent have a good number of students.

The Macao SAR Government has gradually increased the investment in vocational training. Some governmental institutes provide irregular training. For example, the Administration and Applied Science School in the Macao Science and Engineering College run jointly two vocational training classes together with the Department of Education and Youth. One is in-service teachers' tutorial course, and the other is management training courses for youth center workers. Macao Science and Engineering College has published training materials together with the Administration and Public Office. These books are used to train secondary and higher civil servants. According to the statistics, there are 2,000 civil servants who went through the training courses. During the 10 years in which the Department of Education and Youth cooperated with the Education College of Macao University, many summer schools and regular teachers training courses were offered.

1.4.2 Characteristics of Macao's Technical and Vocational Education from the Year 2010

From the year 2010, there are three major characteristics of Macao's technical and vocational education.

First, to cultivate students' personality and to promote their all-round development through general education and community education, which helps cultivate students to have a sense of social responsibility. This is one of the goals of higher education in Macao. Macao Institute of technology, Macao Institute of Tourism, Macao University of Science and Technology and other colleges and universities set up goals for training students in the development of their personality. For example, in order to improve the sound personality, Macao Institute of Technology has general education courses, students learn through the integrity of the knowledge, expand their horizons, develop critical thinking, enhance the ability to analyze and cultural literacy. General education curriculum has two kinds, dominant curriculum and hidden curriculum, the former includes university sports, introduction to information, advanced computer application, history and culture of Macao, the world cultural and natural heritage, music and films, introduction to psychology, sociology, etc. The latter includes academic seminars and campus activities organized by different schools. Under the

²²Feng zengjun (1999). *An Introduction to Macao Education*. Guangzhou:Guangdong Education Press: 135.

cultivation of the dominant curriculum and hidden curriculum, students experience all-round personality education and diversified development. Macao Tourism College also has its own characteristics in the education of the whole person, in addition to providing college education practice and the diversification of curriculum for students, all-round training helps students have service awareness.

Second, continuing education directed by the government and participated by multi joint efforts. Continuing education is an important part of lifelong learning system, which aims for all the members of society, especially for adults. In response to mid-aged residents, the Macao SAR government implemented vocational education and vocational training and life-long education to improve their vocational skills. Under the leadership of Macao SAR government, Macao Labor Affairs Bureau was established, providing different courses and different levels of education to the public. For example, Macao Labor Affairs Bureau provides people of higher education with four-year training programs; providing cultural courses for people in lower level. In addition, the Macao labor bureau also provides continuing training programs, such as refresher training courses, retraining courses, employment assistance programs for young and middle-aged adults, and second-skill training programs to meet the needs of labor market.

Third, lay emphasis on social service and bring staff into full play. Higher vocational colleges in Macao are not only government's educational institutions, but also the source of social service. Relevant scientific research institutions have been set up to complete these functions, for example, Macao Institute of Tourism, Tourism Research and Research Center (ITRC), assisting in industry, management and the public by providing policy references when making policies or decisions. At the same time, the center also assumed the role of the knowledge hub to provide tourism and hotel related research.

1.4.3 Problems with Technical and Vocational Education

Looking at the history of the development of Macao vocational education, one can see in it an effort towards growth and development. But since the government did not take part in the coordination, management, and planning of vocational education, the development has been intermittent, and its scale and structure remains unsatisfactory. From the point of view of the scale of vocational education, there are only five regular secondary technical and vocational schools in Macao currently. In the case of higher vocational education, it is the Macao Science and Engineering College that plays an important role. The number of students those schools enroll every year is limited, which cannot meet the social needs of technical and vocational personnel. Technical and vocational education is not fully developed in terms of both the number of vocational schools and the number of students enrolled. In recent years, however, technical and vocational education in Macao has developed quickly, and the government has increased the investment in education. Higher technical and vocational schools like the Macao Science and Engineering College run

smoothly. Because they were developed on a weak basis, vocational schools are lack of technicians, especially technicians with high level skills.

From the view point of a technical and vocational education system, though there are some secondary and higher vocational schools, they have not formed a complete system in which elementary, secondary and higher technical and vocational education are connected vertically. Technical and vocational education and general education are linked horizontally, as regular education and technical and vocational education supplement each other. The technical and vocational education pattern is in a mess, it lacks an overall plan. The percentage of vocational school students against all students is too low. In secondary education, the percentage is about 5%, while in the four countries, which are referred to as the “four dragons of Asia”, technical and vocational education has the same number of students as general education. This situation is even clearer in higher vocational education.

From the view point of inner structure, the inner structures of both secondary and higher technical and vocational education are not reasonable. For example, though there are some higher vocational schools in Macao, the majors offered and curriculum arrangement still have many problems. Higher technical and vocational education pays less attention to the development of scientific and engineering talents. At the Macao Science and Engineering College, for example, the majors and courses provided are mostly related to humanities and commerce. There are only a few courses of science and engineering. The curriculum offered is not very diverse. Other higher vocational schools are in the same situation. This problem is related to Macao’s special social and economic structure. Macao is a province with a small population and few resources. It’s tertiary industry is quite developed, but the primary and secondary industries are underdeveloped. The labor pool needs for secondary and tertiary industries are small. Currently, the higher technical and vocational education of Macao can basically meets the needs of the current social and economic development. But if education is limited to sustaining the current situation, it will not improve the future development of the economy and society. So if Macao wants to have further improvement, technical and vocational education should be adjusted to actively provide service for its future economic and social needs.

In a word, compared with the social and economic development in Macao, its technical and vocational education lags behind. To remedy this situation, the government should make a plan for vocational educational development and choose the right development mode. The first thing is to unearth the social resources, and encourage and guide private and social groups to support education, strengthen the leadership of the government in vocational education, increase financial input and speed up the development. Secondly, learn a lesson from the successful experience of Hong Kong, by making use of the beneficial rapid growth conditions on the mainland, and strengthening the cooperation and communication between Macao and the mainland.

1.5 Technical and Vocational Education in Taiwan, China

Since the 1960s, the structure of industry in Taiwan has changed greatly, from labor-intensive to knowledge-and-technology-intensive, from an agricultural economy into an industrial economy. In order to meet the needs of industrialization and enhance human resources, adjustments were made in vocational education. Elementary vocational schools have been gradually replaced by higher vocational schools. New two-year colleges for professional training and colleges of technology have been established. They enroll graduates from vocational high schools, and train them as secondary and higher management and technical personnel.

1.5.1 *Current Situation of Technical and Vocational Education*

Vocational schools in Taiwan are divided into three kinds: Higher vocational schools, colleges for special training, and colleges of technology. The three kinds of schools perform their own functions. Higher vocational schools teach students knowledge, skills and professional ethics to help them successfully enter labor market. Colleges for special training provide courses on applied science and practical skills, while colleges of technology cultivate higher technical, engineering and management talents. The number of vocational schools increased from 77 in 1950 to 206 in 1994. The proportion of technical and vocational education to general education increased from 4:6 to 7:3. In recent years, according to the development tendency of science and technology and the change in vocational structure, technical and vocational education has made the following adjustments: Slowing down the development of higher vocational schools; encouraging the establishment of more comprehensive high schools and six-year high schools; starting five-year and two-year elementary colleges and special courses in universities and adding more colleges. Taiwan is narrow in territory and dense in population. During the past 40 years, laborers with good educational background played an important role in its economic development. However, except for some big enterprises, most of the medium and small enterprises could not provide a satisfying training programs for workers due to the lack of funds, equipment and training personnel. In order to solve the problem, Taiwan is planning special courses that are needed for medium and small enterprises. It has also begun a human resource development plan, and established public training colleges offering short-term courses. In 1966, under the support of UNDP and ILO, the Industrial Service Institute was established. Thus other training institutes developed quickly. There are now 13 public training centers and thousands of private training institutes. In 1981, the Bureau of Employment and Vocational Training was established. Its purpose is to manage vocational training and provide employment service. In accordance with the economic development, the development of vocational training in Taiwan has experienced three stages: First, cultivating semi-skilled labors. Second, cultivating skilled

workers and technicians with high comprehensive quality. Third, cultivating skilled technicians and professional workers for automatic industries and service trades, and to provide in-service workers with higher skills training. In recent years, the technical and vocational education in Taiwan has undergone the following changes: Starting and strengthening the worker re-training plan; providing training in vocation transference and second skill training; strengthening the training in computer and automatic industry; carrying out skill test, completing the certificate system; providing training to service trades workers; encouraging enterprises to carry out training; and improving the management skill of administrative and management personnel.

In order to improve the workers' skills, the system of skill testing and skill competition was introduced into vocational training. Meanwhile, the system of vocational qualification certificate was established. This system was opened to all industries. By November 1995, there were 198 industries being tested and 719,655 diplomas were granted. Apart from the unified tests held every year, professional tests are held for workers in enterprises and graduates from vocational schools and vocational training institutes. People who have passed the test can enjoy preferential treatment in seeking employment, and obtaining promotions and getting raises once employed. Currently, more and more workers are required to take the skill tests. About 200,000 people take the test each year, and 45% of them pass and receive the certificate. Many enterprises and training institutes provide in-service vocational courses. Every year, about 230 thousand people receive in-service training (Wu 2001).²³ In 1990, the Labor Council supported enterprises to establish 18 vocational centers and offered 96 courses for training management and technical personnel in public and private institutes. It provides many in-service training programs for people of different circles.

In 2014, Taiwan has 156 universities, among them, 74 are affiliated with the technical and vocational system (including 57 universities of science and technology, 17 technical colleges). The development trend of higher technical and vocational education obviously transfers from the early stage of college education to the current university of science and technology.

Since the beginning of the 21st century, technical and vocational education in Taiwan has set up a model of technical and vocational personnel training system. A multiplicity of entrance channels open to high school graduates, higher vocational graduates can enter colleges, Institute of Technology and University of Science and Technology. They can also apply for the academic university. General high school graduates can also have the opportunity to enter technical and vocational colleges, which not only improves standard of technical and vocational education in Taiwan, but also provides alternatives for the general public to seek education.

²³Wu Xueping(2001). Technical and Vocational Education in Taiwan. Technical and Vocational Education(13): 52.

1.5.2 Reform of Technical and Vocational Education

In order to meet the needs of today's knowledge economy and high quality labor, in recent years, Taiwan has carried out a series of reforms in its technical and vocational education system.

1.5.2.1 Training Professionals in Accordance with the Industrial Development

To match the training of professions with the progressive demands of developing industry, the following four measures were adopted. Turning the excellent colleges of professional training into colleges of technology, by establishing departments of professional training; turning colleges of technology, which meet the standards into universities of science and technology, while establishing new colleges related specifically to the humanities; setting up classes of bachelor's, master's and doctor's degrees in colleges of technology and universities of science and technology; setting up two-year departments of technology or colleges of technology in general higher universities to provide graduates of colleges professional training with chances of further study. Along with these, steps were taken to construct a life-long technical and vocational education system and to develop distant education to provide in-service workers a chance for life-long learning.

1.5.2.2 Strengthening Cooperation Between Schools and Enterprises

As to the cooperation between schools and enterprises, the flexibility and variety of possibilities are especially emphasized. Currently, there are mainly three kinds of collaboration between schools and enterprises: Each student has one month of training in enterprises annually; schools provide training to private enterprises according to a contract; and schools study training problems within the enterprises according to a specific contract.

1.5.2.3 Narrowing the Distance Between Public Schools and Private Schools

The co-existence of public schools and private schools is one of the traits of Taiwan's vocational education. Private schools contribute a lot to the development of education, especially vocational education. However, they receive much less financial support from the government than public schools. In order to change the situation of this unbalanced distribution of resources and to improve the private schools' educational quality, the government increased financial support to the private schools, thus encouraging the fair competition between public

schools and private schools. Meanwhile, the government is planning to provide more scholarships for the students in private schools.

1.5.2.4 Re-designing the Curriculum of Technical and Vocational Education

In the design of the technical and vocational education curriculum, the students' ability to use foreign languages and information technology is especially emphasized. At the same time, the curriculum's flexibility and generality are also emphasized. According to the current stipulation, the curriculum of higher technical and vocational education can be designed by colleges; 40% of the curriculum for professional training can be designed by the colleges themselves, and 60% along with the others.

In a word, in order to meet the needs of scientific and technological progress and economic transformation, the technical and vocational education has carried out appropriate reforms. The reform measures not only to introduce the advanced experiences of developed counties, but also take into account the reality of their economy and education. All the reform measures will greatly influence the development of human resources in the 21st century.

Vocational education is closely linked to industry, in order to improve the quality of vocational education, the Planning Department of Education in Taiwan launched "outstanding teachers" and training plan programs in 2008 and 2009 respectively. In October 2008, "Plan to cultivate high-quality professional human reconstruction" was started, followed by eight expert consultation meetings discussing education programs, curriculum structure, completing collocation of social and economic trends in the development of a comprehensive overall review and planning. The first phase of vocational reconstruction program began in 2010 with three main objectives: First, to improve the teaching environment of teachers and students, to improve the quality of planning, to update the vocational education facilities, to improve teaching facilities and learning resources; second, to strengthen practice link in the era of changing science and technology, to highlight the characteristics of vocational education; third, to cultivate high-quality professional talents, to promote the full range of policies, to cultivate high-quality professional talents with practical ability and employment ability. In November 2012, the Education Department of Planning in Taiwan issued second phase of vocational education reconstruction plan (2013–2017), hoping to promote vocational education competitiveness.

Chapter 2

Vocational Training and Employment



An important sign of getting the formal qualification as a social citizen and being a formal social member is that one is to be employed and shoulder proper social responsibility. It is also the individual's final goal in receiving family and school education; it is the basic fulfillment of an individual's socialization. Also, it is the manifestation as one formally entering the society. This chapter gives a general description of the vocational training system and makes an analysis of the vocational training system, transient employment forms, training and employment market as well as the individual's social obligation in China today.

2.1 Forms of Employment Transition

In China, the form of employment transition is primarily reflected as vocational guidance which is a process of helping people to choose and prepare for a suitable career, a process of helping people to get ready for employment. Vocational guidance is usually divided into two kinds: Social vocational guidance and school vocational guidance. Social vocational guidance is mainly offered for unemployed youths and in-service workers by the Department of Labor and industrial and mining enterprises. Social vocational guidance includes employment guidance, transference guidance, venturing guidance, and vocation adoption guidance. School vocational guidance is mainly prepared for young students by schools. It includes vocational preparation and vocational direction, choosing a career and employment guidance.

2.1.1 History of Vocational Guidance

Vocational guidance in China started in the 1920s, advocated first by returning students from America. In 1916, Tsinghua University tried out vocational guidance. In 1923, the Vocational Guidance Council was set up, but their work was limited to understanding students' vocational aspirations and holding vocation lectures rather than carrying out actual vocational guidance. It is the China Vocational Education Council who propagated, practiced and promoted vocational guidance. In 1917, Huang Yanpei, a famous vocational educator, established China Vocational Education Council in Shanghai. It was the first educational group whose aim was to study, advocate and implement technical and vocational education in modern China's educational policy. Huang Yanpei thought that the aim of education was "to prepare for people to make a living, to prepare individuals to serve society, and for improving the world's and country's productivity." He tried to bridge the gap between school education and social needs with vocational guidance, and to utilize education and vocation to "make the jobless employed and the employed satisfied."

In 1919, the Department of Vocational Guidance was established under the China Vocational Education Council, and it published the *Vocational Guidance Special Issue* to propagate and promote vocational guidance. This was the real beginning of vocational guidance in China. In 1923, the Vocational Guidance Council was established, whose task was to provide vocational guidance for students of vocational schools and youths who were preparing for employment. Thus, they knew about different fields of employment and their requirements. In 1927, China Vocational Education Council established several vocational guidance institutes in Shanghai, Chongqing, Kunming, Guiyang, and Guilin. The main tasks of the vocational guidance institutes were: Investigating, studying and propagating vocational guidance, and holding vocational guidance workshops in the summer of 1928; launching the work of vocational introduction, on the one hand to understand the situation of job vacancy, and on the other hand, to complete a register of those who wanted to be employed; holding short-term vocational training for enterprises; providing guidance for entering a higher school or employment. Through the China Vocational Education Council, schools invited and organized some experienced and prestigious teachers and businessmen to make speeches and provide guidance.

After the founding of the People's Republic of China, junior and senior high schools started to popularize guidance for entering a higher school or employment. It laid emphasis on vocational value education rather than vocational guidance. In the 1980s, with the reform of labor and personnel system and educational system, the government and schools began to pay more attention to vocational guidance. The departments of education, research and labor in some areas made beneficial explorations and experiments. It is clearly stipulated in the Adjustment Advice on Current Senior Middle School's Teaching Plan issued by the Ministry of Education that: Within one or two years, each province, city and autonomous region should try out courses of vocational guidance. In order to implement the stipulation, the People's Education Press organized forces, edited and published books for senior

high school's vocational guidance. Provinces and cities like Shanghai, Hangzhou, Wuhan, Guangdong and Jiangsu have also edited similar books; many schools have arranged vocational guidance classes to provide students with guidance for entering a higher school or employment. In 1991, the State Council issued the Decision on Developing Vocational Education, which clearly states to "carry out vocational guidance in general education." Since then, vocational guidance has made great progress.

In 2014, the State Council issued the Project of Modern Vocational Education System, which points out again that general education schools should provide varieties of vocational guidance for both undergraduates and graduates, such as employment training and service focusing on professional ethics, vocational development, employment preparation and entrepreneurship guidance.

2.1.2 Process of Vocational Guidance

The main content of vocational guidance in China is: Helping students to acquire a correct vocational outlook; helping students to understand the society and different vocations; helping students to recognize the self and to improve it; helping students to handle correctly the relationship between society and the individual, and improving one's ability to choose a career. Vocational guidance generally includes four stages.

2.1.2.1 Understanding Students

Understanding students is an important aspect of vocational guidance. When providing guidance to students, the teachers should try to understand them as fully as possible. Only then can they guide them according to each one's particular situation and help them to understand themselves better and to choose the right career. One comes to understand students in various ways: Observation, talking, investigation, and psychological tests, and so on. By adopting these methods, teachers can understand students fully, including their quality, interests, abilities, personality traits, academic work, family background and so on. The information should be recorded and kept.

2.1.2.2 Information Service

Information service refers to providing students with employment information. It is an important stage in the process of vocational guidance, because understanding a vocation is the premise of choosing a right vocation. Teachers of vocational guidance should collect and sort out information about various vocations and employment to provide a reference for students when they are choosing a career. The employment information provided includes: The trend of employment according to the develop-

ment of the economy, wages, working conditions, and promotion opportunities in a vocation. The minimum qualifications for seeking a job include: academic attainments, specific training, health condition, age, sex, personality traits, and so on. The chance of employment includes identifying long-term and short-term jobs in local areas or even around the country.

2.1.2.3 Advisory

The task of this stage is to help students determine their vocation according to their own traits and related employment information. There are two ways of advisory: Individual advisory and group advisory. The former is used widely. The advisor tries to understand the students and makes a correct evaluation of them by talking with them, and finally suggest to them the right direction of vocation for their background. Advisory can also be carried out in groups where under the guidance of an advisor, members of a group study various vocations, evaluate the potential abilities of members, exchange information and test the various trial choices.

2.1.2.4 Recommendation

The final stage of vocational guidance is to help students to find proper vocations and recommend students to employers. Before recommendation, the school should consider both the social needs and students' wishes. Some schools perform researches after students' employment, to collect and sort out relevant information to be referenced later.

2.1.3 Ways and Methods of Vocational Guidance

The ways of carrying out vocational guidance are: Special vocational guidance courses, including vocational guidance in the teaching of the subjects, extra-curricular activities, social practices and so on.

2.1.3.1 Vocational Guidance Courses

The Adjustment Advice on Current Senior High School's Teaching Plan issued by Ministry of Education speaks of "creating every possible chance to try out vocational guidance courses in each local area within one to two years, providing students with aspirations and guidance, the grade and period being decided according to local conditions, the teaching time arranged in elective courses and extra-curricular activities." Later in the revised edition of Trail Bill on Full-time Junior High School's Teaching Plan, vocational course is considered as a required course.

The task of vocational guidance courses is to lead students to understand various vocations, recognize themselves and improve the ability of choosing a vocation or a major. When deciding the direction of employment, students need to make proper choices. On the one side, teenagers cannot and should not choose a way of life outside their real social condition. The economic structure, vocation structure and technical structure are surely restricted by the social system of politics and economy, level of productivity and development of science and technology. Thus the quality and quantity of jobs provided will change accordingly, and it will surely restrict people's choices. So, it is an important task for vocational guidance to help students to deal with the relationship between personal aspiration and social needs, to acquire correct conceptions of vocation and choosing a vocation. On the other side, teenagers are in a stage of great change both physically and psychologically; they are both mature and naive, independent and dependent. Their self-consciousness is greatly sharpened; they are interested in exploring physical and psychological secrets and analyzing themselves, but their lack of physical and psychological knowledge as well as social life experience unavoidably restricts their self-awareness. So, the society, families and especially, schools should help them to find out about themselves. Vocational guidance courses surely have this responsibility. Besides, whether students can make a correct choice or not depends on both their recognition level of the vocational world, their own qualities and their ability to choose a right vocation. The ability to choose a vocation refers to considering the various subjective and objective factors influencing the vocational choice logically, and then making a decision decisively. It also includes the ability to correct the personal deviations in choosing a vocation. This ability is not inborn, vocational guidance courses are set to cultivate and improve students' ability to choose a right vocation according to the situation of each student.

As to the content arrangement, the Department of Basic Education of the Ministry of Education pointed out in the Experimental Outline on Vocational Guidance Course in Ordinary High Schools that "the course should be both separated and continuous, paying attention to students' acceptance." "Vocational guidance in junior high schools is an enlightening stage of imparting some basic knowledge. The key is to help students to understand the society, vocation and themselves, and make a preliminary decision about doing further study or employment." "Vocational guidance in senior high schools seeks to deepen the knowledge taught. The key is to lead students to understand the majors and vocations in a broader way; to understand and analyze themselves and deal with the subjective and objective factors that influence the choice of a vocation, to improve the ability to choose an aspiration." Vocational guidance course is a part of vocational guidance education and an important way of carrying out vocational guidance education.

As to the form and method, vocational guidance courses are different from general cultural courses, they lead students to understand vocations and themselves, excite vocational interest, and set up vocational ideas rather than teach students systematic cultural and scientific knowledge and skills. Furthermore, the differences between vocational guidance courses and general cultural courses are: Vocational guidance courses do not put any pressure upon students; its effects can only be reflected on the relative reasonableness of students' vocational choice and their adaptability towards

the job they choose. Vocational guidance courses should be lively and flexible. Some experimental schools in Shanghai divide the vocational guidance courses into two: In-class and out-of-class. The in-class activities are held by teachers, they are diverse, except for the general class teaching. There are many other forms, like lectures, students' self-evaluations, objective tests, reports, visits, discussions, and practices. The out-of-class activities are conducted by masters and include: Individual talking and guidance, team talking and guidance, parents activities and so on. The teaching of vocational guidance uses interesting stories and real-life examples; information on psychology, sociology, economics, and philosophy are clearly presented to students. The aim is have students make vocational decisions on the basis of understanding and scientific knowledge.

2.1.3.2 Inject Vocational Guidance into Every Subject Teaching

The labor technique course is a required course. It is the main way of carrying out labor technique education. The tasks of the labor technique course are: To help students acquire the basic knowledge and skills of the modern technology of production; to help them acquire the preliminary knowledge and skills of organization and management, and help them develop correct ideas of labor and good habits. The realization of the above tasks will surely be of help for students to be qualified employees, and it is helpful to bring the students' features and potential into play to prepare for a future vocation career. One of the effective measures to fulfill the task of labor technique education and combine vocational guidance with labor technique courses is to build up industrial and agricultural working bases. They are not only the special places for students to get contacts and acquire the basic knowledge and skills of industry and agriculture, but also the practicing places for schools to carry out vocational guidance. Practicing in those bases will be useful for students to get the correct understanding of labor, vocation, and service. At the same time, it can help students to understand their vocational adaptability.

Analyzing from a broader view point, vocational guidance includes vocational preparation education. That means in guiding students to understand the vocations and themselves and making preliminary decisions of the vocations and majors, it is necessary to lead them to prepare for future vocations in both knowledge and skills. Teaching is the key factor in the whole school system; it gives students systematic knowledge and skills and improves their all-round development. It is the basic way to carry out education in schools. As an organic part of education, it is reasonable to inject vocational guidance into everything that is taught. With the fast development of science and technology, the scientific and technological achievements are broadly applied in social life, the qualification requirements of vocations get more and more demanding. An employee's cultural and scientific qualification affects the effectiveness of his work.

The various subjects in the curriculum influence the students' future. However, undeniably, some subjects are closer to some vocations and students show more interest in learning those subjects. In the book *Vocational Guidance* published by the

People's Press, the editors listed some vocations that were related to some culture courses. In order to carry out vocational guidance throughout subjects being taught, teachers should analyze the nature of the subject and study the exact textbooks, choose the content that is related to vocational guidance and design carefully the teaching plan and methods.

2.2 Training and Employment Market

2.2.1 Approaches and Policies of Employment

It is stipulated in the Constitution of the People's Republic of China that citizens of the People's Republic of China have the right as well as the duty to work. That is, on one side, the country provides every possible means to improve employment and raise the payment. On the other side, employees should regard the work they do as if it is their own. According to the Decision on Developing Technical and Vocational Education, issued in 1999 by the Ministry of Education, the principle of "training before employment" was implemented. In certain cities, employees who had not received any vocational training or are not qualified for a certain post are required to leave. In rural areas, people who are going to be employed by enterprises or institutes should first receive technical and vocational training accordingly.

2.2.2 Policies of Employment

The backbone of China's employment policy lies in the proper development and use of its labor resources. It is necessary to combine the development of social productivity with enlargement of employment, to balance the social benefits and economic benefits and to realize reasonable employment. Since the founding of the People's Republic of China, many regulations and policies have been established, especially with regard to the reform of the policy of labor and employment. A labor and employment system which meets the needs of economic construction and social development has been preliminarily set up.

2.2.2.1 Employment Policy of "Three Combination"

In 1980, the CPC Central Committee and the State Council put forward the employment policy of "three combination", that is, "under the plan and guidance of the government, combine three ways of employment; employment introduced by the Department of Labor, employment by organized groups, and self-employment." Employment introduced by the Department of Labor refers to recruitment of workers

organized by the Department of Labor, according to the real need of economic development. Employment by organized groups refers to employment opportunities created by workers themselves through various enterprises. Self-employment refers to the unemployed themselves finding work or an occupation according to the governmental policies. The realization of “three combination” changed the single way of relying on the government for employment, and it surely aroused the workers’ passion for venturing. The government has also stipulated a series of policies to encourage and support unemployed youth to get employed, for example, the collective enterprises built by unemployed youths in cities and towns can be tax-free for two to three years, and the self-employed can enjoy the wholesale price for materials and resources as state-owned and collective enterprises.

2.2.2.2 System of Labor Contracts

China has followed the employment policy of fixed workers for a long time. Workers are “distributed” to different enterprises by the administration; once an employee gets a job, he is considered to have an “iron bowl” (holds the job until he retires), whether he performs well or not. This obviously destroyed the workers’ enthusiasm. In order to reform this system, the State Council issued several documents. The Temporary Provisions on Carrying out System of Labor Contracts in State-owned Enterprises was one of them. It stipulates that the new workers enrolled by state-owned enterprises should sign labor contracts. The system of labor contracts makes clear the two parties’ duties and rights by signing contracts. In the contract, employees should shoulder the obligation of fulfilling the required task and obeying the work disciplines. Employers should shoulder the obligation of providing working conditions as well as reward, insurance and other welfare measures. Both parties should respect the allotted time signed in the contract. The State Council stipulates that contract employees enjoy the same rights of working and training as fixed workers, they can join the enterprise’s democratic management, and receive political award and material encouragement as well. Their wages, welfare schemes and insurance are generally the same as those of fixed workers. The government pays for workers’ unemployment and retirement pension.

2.2.2.3 Recruitment System of Open Recruitment and Preferred Enrollment

In 1986, the State Council published the Stipulation on Recruiting Workers in State-owned Enterprises, and began to reform the recruitment system, trying out a new recruitment system that is wide open. In this system, recruitment is done openly. After evaluating the candidates, the employer enrolls the preferred candidates. The reform was beneficial to the enterprises to enroll the required workers, and it provided employees with equal chances of competition. An unemployed youth can get into a

post in an enterprise of his choice according to his ability. It helps to eliminate some youth's dependency syndrome and encourages hard work.

2.2.3 Current Situation of Labor Employment

In China, every citizen's right to work is protected by law. The Party and the government have created every possible means to solve young people's employment problems. From 1978 to 2014, almost 400 million people were prepared for employment in cities and towns. The rate of unemployment decreased from 5.3% in 1978 to 1% in 2014. But China is a country with a large population. According to China Statistical Yearbook compiled by National Bureau of statistics of China, from 2010 to 2014, The number of people ready for employment increased from 783.88 million to 796.9 million, which takes up 58.3% of total population in China, while the country's productivity is not high enough to provide all the unemployed with proper jobs. From the 1990s, influenced by the high birth rate in the 1970s, there are over 20 million people looking for jobs every year. With the development of the economic system and the improvement of productivity, there appeared a large number of surplus workers. According to statistics, there are more than 15 million surplus workers all around the country waiting for new employment. In rural areas, with the implementation of the household contract responsibility system, there is much surplus labor waiting to find new jobs. So for a long period of time, China will not be in a situation of full employment.

In order to improve the situation of labor employment, the government has taken many measures. First, control of population growth; stepping up family planning programs and controlling the number of new employees. Secondly, developing the economy, improving productivity, increasing the input, providing more jobs and creating more opportunities for employment. This is the basic way to solve the problem of labor employment. Thirdly, developing the tertiary industry that provides services for production and people's daily life. The tertiary industry has the advantage of less input and great space for employment. Compared with developed countries, though the scale is small, the tertiary industry in China has great potential. Fourthly, developing the collective ownership enterprises and private economy. Collective ownership enterprises have the advantages of less input and quick return; those enterprises can recruit many employees within a short period of time, especially in town and township enterprises. The development of private economy is beneficial to labor.

2.2.3.1 Channels of Students' Employment in Cities and Towns

It is stipulated by the Department of Labor that all citizens who have reached the age of 16 and have the working ability and employment requirements should go through unemployment registration. The registration of the unemployed should be organized

by communities or labor service companies. The unemployed register and receive an unemployed card or job card as the proof of seeking jobs. There are two channels for graduates of high schools in cities and towns: One is employed by enterprises and institutes, and the other is self-employment.

According to the Interim Regulations on the Recruitment of State-owned Enterprises, when employing workers, enterprises, institutes, state organizations, and social groups should implement the principle of training before employment within the country's stipulations. They should try out the new recruitment system of "recruiting openly, evaluating fully and enrolling the preferred." The employers should publish recruitment forms to explain the recruitment requirements. The workers should be evaluated on moral, intellectual and health aspects. The content and standards of evaluation can vary according to the needs of production.

In order to improve the quality of the reserved workers, a two-certificate system is implemented among the graduates of various vocational schools and training centers. The two certificates are the graduation certificate and the technical degree certificate. Within the required learning term, students can receive technical degree certificates. Enterprises and institutes should select for employment technical workers from among students who have the two certificates.

Since 1986, all newly enrolled workers should sign contracts. Contracted workers can get a copy of the labor manual in which the terms of employment like the work time, wages, technical degree and welfare measures are fixed as a proof of mobility, transference, relief and receiving a pension. According to the stipulation, the newly employed workers have to go through a trial period which lasts for about three to six months. After the probationary period, the trial workers can become regular workers.

In order to guide and help youth to get employed, governments, many enterprises and institutes have set up labor service companies. The main tasks of labor service companies are: Support and run collective enterprises, enroll unemployed youth, provide vocational training, create opportunities for youth to venture out, and provide employment information and introduce jobs to them. In addition, many vocational introduction agencies and labor markets have been set up in many cities to provide intermediary service and places for unemployed youth to get in contact with employers.

Self-employment refers to private business. Private economy is a necessary supplement to the state-owned economy and collective economy. Up to 2014, there were about 70.09 million self-employed people in cities and towns of China. Self-employment does not only solve the problem of unemployment, but also strengthens the tertiary industry which is convenient to citizens. Many self-employed people contribute a lot to the society and are welcomed by the masses. It is stipulated that self-employed people enjoy the same political rights as enterprises owned collective enterprises. Graduates who are ready to be self-employed should make an application, and the local bureau of industry and commerce will award business licenses to operators after carefully checking and approval. The business includes industry, handicrafts, construction, transportation, commerce, food industry, service trade, and repair industry, etc. Business like hotel industry, lettering industry, trust industry, and print industry should be checked by local public security organizations. They raise

money on their own. If that is not enough, they can loan money from banks. They should observe the policies of the country and industrial and commercial management, obey vocational morals and pay tax. The government protects their rights of management.

2.2.3.2 Channels of Students' Employment in Rural Areas

Since there are still many differences between rural and urban areas, the channel of students' employment in rural areas is different from that in cities and in towns. The main channels of employment are as follows.

Returning home to farm is the employment of most rural graduates of vocational schools. Farming includes not only planting, but also industries like forestry, animal husbandry, and fishery. With the implementation of the household contract responsibility system in rural areas, the agricultural production takes each family as a production unit, excepting for the grain prepared for their own-use, each family should provide commodities to the country and markets. Family production doesn't have meticulous divisions; members should get familiar with each section of the production and management. This requires full vocational knowledge and perfect skills. At present, a system of "green certificate" has been implemented in some rural areas. Graduates of rural vocational schools and farmers who have been trained can receive "green certificate" after evaluation. People who have "green certificates" can enjoy favorable terms in contracting land, mountain forest, orchards and fish ponds as well as buying fertilizer and pesticides. In rural areas the system of "training before employment" will also be implemented in the near future, so every high school graduate who is ready to farm should receive the necessary vocational training to meet the production needs.

Township enterprises include country-run enterprises, village-run enterprises, farmers co-managed enterprises, and individual enterprises. Township enterprise is an important part of various businesses in rural areas, and it is also an effective way of broadening out and solving the unemployment problem in rural areas. After the Third Plenary Session of the 11th Central Committee, township enterprises have experienced great development. According to the statistics of 2014, the output value of township enterprises was half of the output value of rural society, and there were about 35.75 million workers in township enterprises. According to a prediction, township enterprises will further develop in the coming years. Country-run enterprises can recruit workers from within the country, while village-run enterprises recruit workers from within the village. In order to improve the quality of workers, many township enterprises carry out recruitment examinations to choose the preferred workers. Employees of certain skills are preferred by these enterprises. So graduates who want to work in township enterprises should join vocational training accordingly.

With the economic construction in cities and the development of tertiary industry, many rural laborers are entering cities to find new jobs, especially in the field of construction, geology, mines, transportation, chemistry, and textile, or engage in

business, woodworking, haircutting, wastes recycling, family service, etc. Migrant workers in cities ease the dearth of first line workers in some industries, and improve the development of tertiary industry. Many migrant farmers have won social respect through honest and hard work. Some of them have become advanced producers or excellent family attendants. Migrant farmers working in cities are generally organized by local governments and are arranged by the Departments of Labor in cities, some are introduced by relatives or friends.

2.2.4 Tracking Surveys and Services to Graduates

In order to do the work of rural students' training and employment, some rural vocational high schools carry out unique tracking surveys and services. That is to investigate whether the school's training plans, content and methods meet the actual needs. In other words, technical and vocational education does not end with the graduates leaving the school, it is a process that carries on through the students' learning and working. Tracking surveys and tracking services help one to understand the graduates' employment situation and the problems and difficulties graduates face in work. These problems can be solved with the help of schools. Tracking surveys and tracking services can reveal the employers' demands for talents in rural areas, the graduates' demand for knowledge and skills as well as the producers' demand for technology. They can be the foundation for the setting of majors, for the reform of teaching content and teaching methods as well as governments' policies on graduates' employment and support. The practice of recommending graduates to employers and supporting graduates to work hard by schools is welcomed by parents, it also helps technical and vocational education to earn good reputation and push forward the development of rural technical and vocational education.

2.2.4.1 Contents of Tracking Surveys and Services

Survey of teaching situation. The survey of teaching situation is to investigate whether the school's majors, curriculum arrangement, and the teaching of cultural courses meet the actual needs of rural areas. Whether they develop what is practical and improve what is not satisfactory.

Renew the technology, make good omissions and deficiencies. Rural graduates are scattered in different jobs, the transportation is not convenient for them and the information is not upgraded in a timely manner, the promotion of new methods and technology relies on the help of schools. Especially in rural areas, the upgrading of agricultural technology is restricted to seasons. If the schools can provide service in a timely manner, it will help in improving production, teaching and the quality of the graduates.

Evaluate the experiences of graduates' employment and initiation. When evaluating the experiences of students, we should pay attention to their positive and negative

aspects, study their traits, highlight the influence of school, society and the graduates in improving the school work and the development of vocational technology.

Coordinate the contradictions, improve the employment environment. Graduates of rural vocational high schools don't have distribution indicators, they have to find jobs themselves, so they should be supported by the government and various departments. Tracking surveys and tracking services can help in understanding the graduates' employment situation as well as the main factors that influence graduates' employment. They provide leaders with the grounds of designing employment policies and clarifying the department responsibilities, and finally improve the social environment of graduates' employment.

2.2.4.2 Methods of Tracking Surveys and Services

Establish the system of tracking surveys and services. It is hard for schools to carry out tracking surveys and services for graduates of rural vocational high schools. Social forces should be involved in assisting the establishment of this system. The system includes departments of agriculture, forestry, township enterprises, council of science and technology, the association of science and technology and education, providing guidance to graduates of vocational schools. Graduates who work for agricultural production can enjoy preferential treatment in buying fertilizer, pesticides, seeds, technology, and information. Science popularization associations should actively enroll graduates of vocational high schools as members. Cadres of education take charge of the work of tracking surveys and services and provide information for employment.

Establish the policy of tracking surveys and services. Rural vocational high schools should consider the work of graduates' tracking surveys and services; they should design clear stipulations and carry them out firmly. For example, surveys in fixed places which should be carried out year after year; full surveys which can be carried out once in several years; technical service should be provided for long.

Combine "distribution" with "introduction". According to the farming situation, combined with the social activities of admission, distribution and internship guidance, schools can assign teachers to investigate into graduates' working units and families to listen to the opinions of people of various circles toward the graduates. Schools can also invite some graduates to come back to exchange ideas or hold representative meetings to share experience. The experience and problems reflected in the forum should be sorted out to improve further development.

Establish the basis of school's programs. After leaving schools, because of the lack of transportation, information and technology, graduates of vocational schools can hardly find the right way to improve their economic situation. Schools should establish bases to provide corresponding tracking services. The graduates in turn become the agents to promote new technology to farmers and push forward the development of rural economy.

2.2.5 Developing Tendency of Vocational Training and Employment

Technical and vocational education, especially the technical and vocational education in and after the stage of senior high school and vocational training for in-service workers are the key areas that should be seriously considered in the process of adjusting the human resource structure and education structure. The development of technical and vocational education is of vital importance to the survival and development of industries and enterprises. It is important to develop technical and vocational education and training at various levels and forms over a long period.

First, with the popularization of the nine-year compulsory education it is quite urgent to develop technical and vocational education in and after the stage of senior high school. In 2014, there were about 43.85 million junior high school students. According to the statistics of 2014, there were 14.58 million junior high school graduates. Though the rate of senior high school enrollment increased 1%, various senior high schools enrolled about 14.16 million students, and various secondary technical and vocational schools enrolled about 6.2 million students, there were still about 4.16 million graduates who could not get a chance for further study. They needed to be trained before employment. So the task of developing technical and vocational education in the stage of senior high school is quite important. Xi Jinping has pointed out in a meeting on education that “it has to be given high priority to develop modern vocational education, and at the same time, to support and help its development in order to cultivate new talents. Only in this way, can our “double one-hundred-year” and Chinese dream be realized.”

Secondly, the task of training in-service workers and the unemployed youth is urgent. Among the 773 million unemployed people, the proportion of people who have the academic credentials of primary school or junior high school is 73.4%. In addition, according to the statistics of 1995, among the 208 million unemployed people who have reached the age of 16, there were 9.15 million people who were never employed or were seeking jobs. Among them, 59% were junior high school graduates, 14.3% were primary school graduates, 0.9% were illiterate or semi illiterate. At the same time, there were 2,373,000 laid-off workers who were waiting for new employment¹ (Hao 2000). This showed that the two groups of people account for a large proportion.

Thirdly, since the development of society and economy needs a great number of primary and secondary technical staff over a long period, developing technical and vocational education and training will be a long-drawn task. Considering the form of economic development, in China there is co-existence of agricultural economy, industrial economy, knowledge-based economy which is in the embryonic stage and some other forms of economy. Because of different technical equipment and technological content, different enterprises have different requirements for workers. The development of economy needs both imitative talents and workers who apply

¹Hao Keming (2000). Several Questions on Rigorously Developing Vocational Education. *Educational Research* (9):35–38.

technology to production. We can introduce advanced technical equipment, but we need highly qualified workers who can use those advanced equipment. Social and economic development's demand for talents is diverse. They need not only higher expertise, but also workers with primary and secondary skills. In some developed countries, the ratio of engineers, technicians and skilled workers is 1:3:15, while in China, the ratio of engineers to technicians is 1:0.7. Surely, it does not mean that China has too many engineers, but rather, that we don't have enough technicians. Because of the lack of technicians, some engineers have to do the work of technicians which is a waste of talent. The structure of technicians in China is also not so reasonable. In enterprises in developed countries, the percentage of higher technicians is 20%, the secondary technicians is 50% and the primary technicians is 30%. While among the 40 million technicians in state-owned enterprises, the percentage of higher technicians is 2–3%, that of secondary technicians is 27% and that of the primary technicians is 70%. Because of the lack of higher technicians, primary technicians have to shoulder the tasks that should have been carried out by secondary technicians, and it leads to the uncertainty of product quality. In a word, the cultivation of a large number of high quality workers requires qualified technical and vocational education and training.

In employment, with the establishment and improvement of socialist market economic system, the employment tendency will have the following traits:

First, the labor and talents market will make further progress. With the deepening of the reform of the labor department and personnel department, the employment system will be gradually replaced by the labor and talents market. With the narrowing of directive plans, the scale of labor and talents market will become larger and larger.

Secondly, the concept of choosing jobs freely will be accepted by the masses. The development of market economy requires enterprises and institutes to break the "iron bowls". The way of employing workers according to the needs of production will be accepted by employers gradually. The contract system will become the main employment form. The development and improvement of labor and talents market provides employers and employees with the condition of two-way selection. The conception of choosing jobs freely will be accepted by more and more people.

Thirdly, the way of labor employment becomes diversified. Among the three industries, the tertiary industry has the most employees. There will be a lot of rural people working in township enterprises, laborers in underdeveloped areas will go to coastal areas to find new jobs. As a factor of economic development, talents and laborers will be more reasonable under the arrangement of the market. In the future, the employment of the labor force and their distribution in different areas, fields and posts will mainly rely on the adjustment of market rather than on the government.

There are about 10 million graduates from technical and vocational colleges, which is the important source of advanced and skilled technical talents. More than 70% of newly increased technical talents are graduates of technical and vocational colleges, they are employed in the lines such as China Railway Highspeed, Urban Rail Transit, modern logistics and electronic commerce. The employment rate has been over 95% in the past 9 years for secondary vocational education and 90% for vocational colleges.²

²Yu zhijing, etc. (2016). Transferring from a Great Nation to a Powerful Nation of Technical and Vocational Education. *Technical and Vocational Education*, 2016(6):11.

Chapter 3

Curriculum of Technical and Vocational Education



3.1 The Meaning and Characteristics of Technical and Vocational Education Curriculum

3.1.1 *The Meaning of Technical and Vocational Education Curriculum*

The curriculum includes teaching content and courses. As the curriculum is comparatively stable, it can lag behind the development of science and technology and economy to a certain extent. This leads to the inconsistency between education imparted and the demands on personnel by the society. In the development of modern education theory, the curriculum, as a project of training people, is gaining a more and more important status in education.

The meaning of curriculum can be understood in a narrow sense or a broad sense. In the narrow sense, curriculum is the sum total of the goals, content, range, activity, and course of teaching. It can be shown through the teaching plan, teaching outline and teaching material. In the broad sense, curriculum means the total experience gained from school, which includes selecting the subjects, establishing the activities in class, the teaching process, activities after school, and the overall environment of the school.

What's the meaning of technical and vocational education curriculum? In a word, the curriculum of technical and vocational education includes the content of teaching in classrooms, the content of learning after school, and the content of students' self-learning. In other words, it refers to the whole program of teaching and learning in vocational education. The key point of emphasis is that the technical and vocational education curriculum consists of two correlative concepts: One is the apparent curriculum which means the course set in the teaching program; and the other is the recessive curriculum which includes the material circumstance such as the building,

cultural circumstances such as the classroom atmosphere, and the interpersonal circumstances such as the relationship between the teachers and students and so on¹ (Wu 2007).

3.1.2 Characteristics of Technical and Vocational Education Curriculum

The curriculum of technical and vocational education has the following characteristics:

First, the goal of the curriculum is directional. Technical and vocational education aims to train those with practical ability in the first line of manufacturing industry or social work such as workers, waiters and managers. If the persons trained by technical and vocational education have to satisfy the needs of the labor market, the curriculum must persist in its goal to train persons with practical ability. So the goal of curriculum needs to be confirmed by the vocational domain. In addition, different districts differ in the economic development and different industries have different levels of technology, so even in the same vocational domain, the demand for persons with ability varies. This means that goal of curriculum is directional in district and industry.

Secondly, the content of curriculum is practical. That means the content of technical and vocational education curriculum must be strictly related to vocational practice. Technical and vocational education, in order to train skilled persons, must emphasize the idea that what is learnt can be applied. The laborers trained by technical and vocational education need to work in the first line of the three industries. Thus, technical and vocational education must attach importance to the practical aspects practicability of the curriculum. The behavioral skill and the mental skill demanded in vocational practice is the key to the curriculum content, and the professional academic knowledge related to these skills is the basic requirement of the curriculum content.

Thirdly, the implementation of the curriculum is integrated. Virtually, this characteristic reflects the whole system of vocational operation. The integration is related to the process of vocational operation in which the programming, implementation and evaluation of curriculum is interrelated. Vocational operation should not only impart knowledge and skill, but also cultivate the ability to work out a plan, implement it and evaluate it independently. Essentially, to work out a plan requires a skill to diagnose and forecast, to implement the plan requires the ability to follow up a project or activity till it is done and to evaluate the plan one needs to compare the results intended and the results achieved. In this dynamic teaching-learning process, students' ability

¹ Wu Xueping (2007). *Fundamental and Applicable—Study on Higher Vocational Education Policy*. Hangzhou: Zhejiang Education Press: 34–201.

will be improved in an all-round way. The integration of the vocational operation requires the laborers ability of planning, implementing and evaluating² (Wu 2007).

In the process of modernization and structural transformation, Chinese enterprises require their staff to have all-round ability and be innovative. Different from traditional curricula, the new curriculum highlights that education aims not only at teaching occupational skills and knowledge but also cultivating students' soft-skills and cross-curricula competency with work-related knowledge. The new curriculum aims at helping students to understand work process to gain initial work experience, to analyze and solve complicated problems, and to develop ability to plan, organize, implement and evaluate. The new curriculum features so-called "core training projects", proposes a breakthrough from traditional disciplinary system to establish a comprehensive and case-based training program which is related with practice. Students experience the whole "work process" including task-taking, independent working, presentation and evaluation. To develop holistic action competence, students need to deal with their tasks and knowledge from a wholesome perspective. The new curriculum introduced the learning concept of Action Orientation, e.g. using "complete action mode" to replace "partial action" mode in learning process which is set to finish assignments based on external regulations³ (Qin 2013).

3.2 Setup Orientation of Technical and Vocational Education Curriculum

3.2.1 Setup Ideas of Curriculum

The idea of quality in the setup of curriculum is that in order to improve the quality of vocational education, we should pay attention to students' all-round development and the ability of innovation, initiation, and practice, so the curriculum of technical and vocational education needs to be integrated. On the one hand, the knowledge-oriented curriculum mode needs change. We should construct a new curriculum mode that integrates the knowledge structure, ability structure, and personality structure. On the other hand, the curriculum should improve its flexibility. The national curriculum, regional curriculum and the school-based curriculum should be developed harmoniously.

The idea of efficiency in the setup of curriculum is embodied in perfection, practice and novelty. Perfection means the curriculum must be reformed in order to train skilled persons. Practice means the cultural and technical knowledge must be applied in work. Novelty means the curriculum must reflect the development of the new

²Wu Xueping (2007). Basis and Application-Study on the Policy of Higher Vocational Education. Hangzhou: Zhejiang Education Press: 34–201.

³Qin Xin (2013). Research on Comprehensive Teaching Design for Engineering Courses in Higher Vocational Colleges Based on the Integration of Work and Learning. Modern Vocational Education, 2013 (6). pp. 24–26, 45.

knowledge, new technology, new method according to the changing demands of the market economic and the challenge of global economy integration. In face of the demand of building a well-off society in an all-round way and the challenge of global economy integration, the setup of technical and vocational education curriculum must give prominence to the cultivation of the students' personality, integrate theory with practice, develop school-based curriculum in order to train students' initiatives and promote competitive ability and efficiency of the curriculum.

The idea of development in the setup of technical and vocational education curriculum must meet the demands of building a well-off society in an all-round way. The essence is education for all-round development; and the goal is lifelong education. First, the setup of curriculum needs to turn single occupation to an occupational group, not only to enable students to turn to a new job, but also to master the common theoretical knowledge of technology in the occupational group. Secondly, the curriculum needs to turn skill training to teaching a method of skills learning and improving. The practical curriculums with low technological content must be adjusted and enriched. Thirdly, it is necessary to reinforce the foundation curriculum and professional theory curriculum. Only in this way can the students update their knowledge and possess the ability to deal with an emergency, survive and develop successfully.

3.2.2 Setup Goals of Curriculum

3.2.2.1 Future Focus in Curriculum

With the rapid development of technology and drastic changes in the organizational form of work, the boundaries between the former subjects and vocation is broken. Multiple high-tech posts need highly skilled versatile personnel. Those jobs which demand only a single skill have been reduced dramatically. What is more, with the improved productivity, pure manual labor will be replaced by more mental labor, and the posts with high intelligence have become the mainstream in the human resource market at the beginning of the 20th century. Technical and vocational education must take into account the demand of social development and students' development in order to lay a broad foundation for continual learning.

In the socialist market economic system, with the industrial structure upgraded, the occupational structure is also in a stage of dynamic change. People no longer stay in the same occupation, most employees will experience the cycle of transferring to another job-unemployment-reemployment. So the technical and vocational education curriculum needs a wide range of knowledge to enable students to have more necessary theory and technology.

In times to come, the most important task of vocational schools will be to provide the best education which not only enables students to master the professional knowledge and technology, but also develop in themselves, the ability to think, explore new paths and put forward new ideas.

3.2.2.2 Meet the Demands of Current Development

The goal of technical and vocational education must integrate two theories: Factualism and futurism. The curriculum of technical and vocational education should focus on the future which is completely correct. But that doesn't mean it should deviate from the situation within our country. We should analyze the current demands and confirm the goal of the national, regional and school-based curriculums based on the fact that China is a developing country.

In other words, the complexity of the society demands the diversity of the goal of vocational education. We need to comprehend the intention and the extension of the goal based on social needs and individual needs, and at the same time we should be realistic and look to the future, focus on the foundation and stress on the development.

3.2.3 Framework of Curriculum

Curriculum has two goals: Imparting knowledge and developing ability. The two goals experience a complex changing process. From the original integration of imparting knowledge and developing ability to education for all-round development; it reflects directly the development of economy and culture.

In the practice of curriculum setup, experts in technical and vocational education are often puzzled by the gap between appropriateness and adaptability. As a sort of occupational education, it must aim at a certain vocational range. However, as a sort of school education, it must differ from short-term vocational training, and students must learn how to adapt themselves to future development.

In the development of curricular setup, the traditional idea of education is being replaced by the new idea like lifelong education and education for all-round development which is at the core of vocational education. At the same time, the development of network technology will also result in revolutionary changes of curricular framework.

Based on the above macroscopic background analysis, setup of technical and vocational education curriculum must aim at all-round development of students and construct a curricular system that rests soundly on the two dimensions of extension and depth.

The idea of "wide base-flexible module-multi-direction-students first" is the new construction mode for technical and vocational education curriculum that is being put forward based on the experience of past generations and the characteristic of vocational education. The point to emphasize here is that the 'wide base-flexible module-multi-direction-students first' is a construction mode, not a teaching mode.

3.2.3.1 Wide Base

“Wide base” means the curriculum aims at the necessary knowledge and technology of occupation and the training of professional skills in order to give training in a few core competences and lay a foundation for students’ continual learning. “Wide base” consists of four kinds of curriculum that is cultural curriculum, tool curriculum, ability developing curriculum, and professional curriculum. Every kind of curriculum includes a group of subjects, and every subject also consists of some modules. So anybody with a different specialty, different level and different needs could choose the content he wants to learn. It is important to accurately grasp the extent of “wide base”, neither pursuing the width of specialization of subject knowledge, nor the depth of single occupational technology.

3.2.3.2 Flexible Module

“Flexible module” means knowledge unit and skill unit designed according to the occupation groups which mainly focus on the training of professional technology. The setup of curriculum construction and the organization of the teaching content are guided by vocational qualification. Schools can combine these modules according to the social needs, and then students choose the curriculum according to their personality and future need. Flexible module is diversified and flexible.

3.2.3.3 Multi-direction

“Multi-direction” serves students’ employment and development. From students entering vocational colleges to graduating, they typically need two to five years commonly. However, when they choose their initial specialty initially, they are not always clear about their majors. So it is advisable to train students in multi-directions. In the first one or two years, students need to learn public culture knowledge and basic professional knowledge and receive the training in professional skills. After they lay a strong foundation of vocational quality at the first stage, their specialty will be finalized according to the students’ personality and interest in the next year. At this time, the module will be integrated specially to face the competition of the human resource market in which the integration of practical module and the training of skill is the working priority

3.2.3.4 Students First

“Students first” means the curriculum should perfect students’ personality and improve their quality. The final goal of “wide base, flexible module, and multi-directions” is to promote students’ all-round development in ethics, intellect, physique and to be highly skilled in technology with the spirit of the age. In this

age of knowledge-based economy, students from vocational school not only need broad knowledge and skills, but also healthy vocational psychology, the thought of self-employment and the ability to develop themselves life long. All these are the core factors we need to consider in the setup of technical and vocational education curriculum.

To sum up the above arguments, highly skilled persons need certain basic theoretical knowledge of some occupations, so the integration of the culture curriculum and the tool curriculum is a kind of oriented structure. However, highly skilled persons work in the forefront of production; all the technical problems they come up against are integrated, so the curriculum of professional technology is a kind of integrated construction⁴ (Wang 2004).

3.3 Types of Technical and Vocational Education Curriculum

From the worldwide scope, technical and vocational education mainly consists of two kinds of curriculum: Knowledge-based curriculum and competence-based curriculum. The former focuses on imparting vocational knowledge, and the latter aims at training in vocational competence. On the whole, technical and vocational education in China is based on knowledge. But this division is not absolute, even in the same nation; the types of curriculum vary in different stages of its history⁵ (Wu 2007). Generally speaking, the traditional vocational education is oriented on knowledge acquisition. The practice of vocational education curriculum development is in a large part the practice of handling the relationship between theoretical and practical learning. It reflects the variation of understandings about the philosophy of vocational education.

3.3.1 Knowledge-Based Curriculum

3.3.1.1 Characteristics of Knowledge-Based Curriculum

The characteristics of knowledge-based curriculum can be analyzed from the method of curricular development and arrangement.

The education domain and the vocation domain run differently, and the technical and vocational education combines the two domains. Different kinds of curricula have

⁴Wang Minglun (2004). *The Development of Higher Technical and Vocational Education*. Beijing: Education Science Press: 76–151.

⁵Wu Xueping (2007). *Basis and Application-Study on the Policy of Higher Vocational Education*. Hangzhou: Zhejiang Education Press, Hangzhou.

different logical starting points, in their methods of development. Some curriculum start from the point of education, and the others start from the point of vocation.

The developing method of Chinese technical and vocational education starts from the logical starting point of education which is based on the subject system. And the personnel participating in the development of vocational curriculum mainly come from among educational experts and scholars, only a few from business community. For a long time, Chinese curricular development mainly focused on the writing of teaching plan and syllabus, and this work has always been finished by certain institutions under the guidance of the national education department. As to the curriculum, schools are often concerned with the teaching plan and syllabus promulgated by the national educational department, while the educational research department mainly expounds the function of the teaching plan and syllabus, hardly involving itself in the method of curricular development. As a whole, Chinese curricular development mainly adopts the pursuant method and introspection method. The pursuant method is to develop the curriculum based on the logical system of subject knowledge according to the national training goal and the education theory. And the introspection method means teachers put forward the most appropriate content with their teaching experience. Generally, several teachers speak out their ideas about the curricular content at first, and then the content will be discovered and finally confirmed by all the teachers. However, the curriculum designed by teachers often lacks the relationship to the actual vocational needs because they always focus on the inside of school.

In other words, the curricular content of Chinese technical and vocational education focuses on the theory, the basis and the system which changes slowly with the development of educational theory.

Chinese curricula are always arranged according to subjects. The subject curriculum often divides the teaching content into several subjects to roundly expound the whole subject knowledge. Every subject rests on the basis of a close logical relationship and the subject logic is just the inherent connection of the professional knowledge. The goal of subject curriculum is to let the students know the basic logical structure and the basic concept, principle and law of the subject. The systematic subject curriculum has been dominant in the academic curriculum to this day from the start of the curricular arrangement. In China, for many years, the method of arrangement and part of the curricular content of technical and vocational education came from liberal education. The subject curriculum ranks the subjects in a certain order which are interlinked and also independent. The broad architecture of subject curriculum places special stress on the integration and system of subject. This type of subject curriculum is convenient for collective teaching, and students can learn the knowledge systematically. But the limitation of subject curriculum is obvious. Overemphasizing the integration and system of curriculum will lead to putting more emphasis on theory rather than practice. So the technical and vocational education will lose its trait. What's more, overemphasizing independence will also lead to the lack of the curricular connection.

Generally, Chinese technical and vocational education curriculum focuses on commonness and knowledge. The curricular structure is rigorous. It is convenient for collective teaching and good for improving students' academic quality.

3.3.1.2 Basis of Knowledge-Based Curriculum

Technical and vocational education curriculum is associated with one's attitude toward knowledge and competence. Modern technical and vocational education in China started with the vigorous push of the Westernization Movement. At that time, modern industry was neither based on a favorable basis nor was it developed well. Because industry, especially in its initial stages, was on the fringes of society, its influence on technical and vocational education was very little in comparison with the influence of traditional mainstream culture. Against this background, technical and vocational education has been kept away from industry. So the goal and content of education rarely reflected the actual needs of industrial production.

The outlook on knowledge consists of two aspects: The category and the structure of knowledge, and what kind of knowledge is most valuable. Founded on the function of knowledge, Anderson (1982), Stevenson (1994), Perkins (1993) divided knowledge into three categories: Declarative knowledge, procedural knowledge, and dispositional knowledge. Declarative knowledge is about "what something is" which can be stated directly by acquiring some clues consciously. This sort of knowledge mainly comes from the outside world which is the reflection of the objective things and their internal relations. And the best method of acquiring declarative knowledge is by understanding and remembering. Procedural knowledge is about "how to do something", that is, information about the process and method of accomplishing some task. This sort of knowledge is based on indirect conjecture which is the outcome of practice. And it is mainly learned by actual activity. Dispositional knowledge is about "what is to be done". This sort of knowledge is critical. Dispositional knowledge is obtained through long-term personal experience and emotional experience which guides the creation and exertion of the first two sorts of knowledge.

Chinese technical and vocational education emphasizes conceptual knowledge comparatively. Conceptual knowledge is the most basic knowledge about basic concept, brass tacks and basic principle which can deduce a series of other knowledge. Though the relationship between conceptual knowledge and vocational training is difficult to be determined, conceptual knowledge can improve students' ability of understanding and analyzing. It is the basis of learning procedural knowledge and dispositional knowledge. It is also the basis of developing ability. Conceptual knowledge can be displayed and encoded obviously, so it is easily taught and learned, and the effect of teaching is easily checked.

For a long time, Chinese technical and vocational education has been emphasizing cognitive ability. They consider that competence is the individual psychological feature which shows up and develops in individual activity. It is the cognition about the subjective and objective world. Competence can be divided into three levels: Cognitive ability, practical ability and emotional ability. Cognitive ability means the ability of understanding the objective world by observation, notice, remembrance, thought, and imagination. Practical ability is operational ability, the ability to do things, solve problems, etc. Emotional ability includes the ability to communicate with others, the ability to boost self-motivation, and the ability to apperceive and adjust own emotion. Though these three types of ability are all needed in any vocational activity,

they have different status and at different levels. In general, cognitive ability is at the core level, which is regarded as the basis of acquiring the other two types of ability. Technical and vocational education should focus on training cognitive ability which is mainly trained and developed through imparting systematic knowledge.

We can see different outlooks on competence from the goal, the developing method and the arrangement of the Chinese technical and vocational education curriculum which emphasizes particularly the training of cognitive ability. The development of curriculum is mainly guided by the criterion of education. Generally, it is developed independently by the education department with little participation of enterprises.

3.3.2 Competence-Based Curriculum

3.3.2.1 Characteristics of Competence-Based Curriculum

The competence-based curriculum starts from the logical starting point of vocation which is based on the demand of the vocational post. So two thirds of the people who develop curriculum are from enterprises. This sort of method of developing curriculum mainly includes task analysis and expert advice. The task analysis method attempts to find and validate the task executed by the staff on special posts. This method includes five basic stages: Hunt out associated documents, design a vocation questionnaire, do spot checks, manage the vocation questionnaire, and analyze the collected information. The goal of task analysis is to confirm the nature and the content of the work and the knowledge and skill which is needed for finishing this work in order to arrange the curriculum. Expert advice method means to consult the expert on some special field by correspondence. Because the advice provider and receiver will not meet each other, the individual thought will not be influenced by others. Anonymous questionnaire will make the answers thoughtful and creative. Expert advice method generally consists of several steps. In the first step, several experts list some important curriculum contents. In the second step, some experts check all the contents collected in the first step, which will be brought into curriculum according to the importance. Then in the third step, experts need to reach an agreement on the curriculum content, and if possible, they also need to modify their own ideas. In the final step, experts need to evaluate the unanimous agreement again.

The competence-based curriculum arrangement generally adopts a module curriculum. Students can select the appropriate unit with special aim and special need. Different modules can be integrated freely. Module curriculum has the following characteristics. The first characteristic is openness, which is embodied in the integration of modules. Students can select and integrate learning content with their own knowledge basis and interest. In choosing curriculum, teachers change the role from decision-maker to coordinators. The second characteristic is concrete, which is reflected in the stating of curriculum goal. Different from the abstract traditional curriculum goal, module curriculum has obvious and concrete objectives which can be expressed with measurable behavior terms. So it can also be regarded as the cri-

terion of evaluation. The third characteristic is invigorative. We can see it from the activating effects of module curriculum towards students' study. The advantage of module rests with terseness. The curriculum arranged with module is never in detail, especially in evaluation. With the learning packages of different lengths, it can be evaluated in a short time, so each student can gain direct information feedback. Gaining acceptance of teachers, students would be inspired to learn the next part in accomplishing a part of the curriculum.

In other words, the competence-based curriculum emphasizes more individuality and competence. Curriculum structure is compact and flexible which is easy for individual teaching. And it is in favor of improving students' vocational competence.

3.3.2.2 Basis of Competence-Based Curriculum

The competence-based curriculum leans to procedural knowledge and focuses on practical and applied content. After a lot of study, Professor Micheal Eraut⁶ in Britain summarizes the component parts of procedural knowledge as executing mode, executing method, executing environment and executing result. Executing mode includes practical executing mode which is prescribed, practical executing mode which is added with new technology, and practical executing mode with personal style. Executing method includes method executed strictly according to instruction, and is a method that is not emphasizing instruction very much and resting on individual insight. Executing environment includes special environment and those which change within certain limits. Executing result includes result to be expected, nonfinite but expectant result and novel result. These component parts can be integrated freely.

The competence-based curriculum emphasizes job competence. Technical and vocational education needs to train students' job competence so that they become competent for actual jobs. Generally, job competence consists of four component parts: The ability to reach technological expectation, the ability to handle emergencies, the ability to correspond with task and the ability to adapt to job environment. Technological expectation means the expected results required by a special vocational post and each vocational post is different in technological expectations. The ability to reach technological expectation is the core of vocational competence. The ability to handle emergencies means to cope with emergencies independently under various conditions which include analysis, judgment, decision-making, selecting solutions, carrying out action and evaluating the result. The third ability means to correspond with tasks according to the actual condition and the last sort of ability means to adjust to the environment.

⁶Micheal Eraut (1999). *Kinds of Professional Knowledge: Modes of Knowledge Use and Knowledge Creation*. Washington, D.C. Falmer Press: 6–7.

3.4 Development of Technical and Vocational Education Curriculum

3.4.1 Principles of Curriculum Development

The curriculum development of technical and vocational education includes the design of the scheme, the criteria, and the authorized teaching material of the curriculum. Curriculum development basically adheres to the following four principles.

3.4.1.1 The Principle of Diversification

In the more mature socialist market economic conditions, technical and vocational education has two attributes: Social public welfare and market commodity. On the one hand, the education policy, school orientation, and teaching content of technical and vocational education should be in line with national and public interests of the whole society. It is sensible to adhere to the principle of interest diversification as the development of vocational curriculum, which relates to different kinds of interest. This principle, which relates the personnel training to the requirements of society and market decides whether the development of the curriculum is successful or not. Keeping in line with the requirements of society is the start of the vocational curriculum development. So it is very important to make clear the specific requirements of the market, which can be received from the large number of technical and vocational education graduates who have been spent a long time in the practical posts and doing the specific work of this field, whose suggestions, advice and feelings are useful to the success of the curriculum development. This means we need to do a thorough and meticulous investigation to get a real understanding of the requirements and thoughts of the employees, and at the same time, try to get the direct and first-hand information. This also needs to ensure the hiring of the corresponding social persons to be involved in the curriculum development. It is also critical to share analysis and discussions with them so that they may become an important part of the curriculum development. From the trend of the diversification of the main body of the curriculum development, social persons are not only the investigation part, but also the active participants of the curriculum development. They do not just take part in the whole process of the curriculum development, but they also have the right to check and evaluate the last version of the curriculum development.

3.4.1.2 The Principle of Decentralization

The purpose of the curriculum of technical and vocational education is to prepare the graduates to enter the job market and become productive agents in industry. The curriculum should therefore keep in mind the needs of the society, on the state of the industry in the country and the specific requirements of the labor market, which is

never stagnant, but always evolving. The task of developing such a curriculum needs the cooperation and participation of many sectors. It cannot be done by the education department alone. It requires the decentralization of the process of curriculum development. Decentralization implies that many different departments should participate in the process of developing the curriculum. This can be led by the teaching department of the vocational academies, along with those from the industry, and various departments of science and technology, academic administration, etc.

3.4.1.3 The Principle of Specification

The training of personnel in technical and vocational education is complex. In order to achieve an ideal level of the teaching goal in the given period of time, the program not only needs to cultivate the fundamental technical application ability of students, but also their practical ability to solve practical problems. This means special attention should be paid to the following aspects during the curriculum development: The unity of theory and practice; the aggregation of the existing traditional courses and teaching experience; the choice of the useful curriculum elements from many subjects to make a sensible combination; the making of a curriculum totally different from the common courses; the arrangement of the curriculum; the connection between different curriculums; the proportion of teaching hours for different courses. To be more specific, the specification of curriculum goals means, on the one hand, that it needs a clear tenet, and guidance idea to have full control of the work regardless of the design goal of the course itself or the goal of the whole vocational curriculum development; on the other hand, it needs specification, pertinence and clear meaning, no matter if it is for the overall goal or the sub-targets. The expression of overall goal must take the features of the industry field into account, and the sub-targets need to be as concrete as possible. Besides, curriculum weave should be outspread from the center of the goal to avoid the blind curriculum development which is contrary to the market features and post requirement. Of course, the goals should be reasonable which are decided after repetitive investigations and can fully reflect the diverse demands of vocation ability, post group requirements and students learning requirements.

3.4.1.4 The Principle of Dynamic Management

Vocational curriculum development is a long drawn out work process, which cannot be accomplished in a single day. We have to continually research new problems, accept new knowledge, bring in new technology, use new methods and manage the curriculum development dynamically. On the one hand, technical and vocational education always emphasizes the personnel training to keep in line with the requirements of the society. The actual demand on employers is changing gradually, so the vocational academy must adjust the teaching content and enrich the connotation of curriculum according to the changing demands of the society and the development

and application of science and technology. Only in this way can a curriculum with special features of technical and vocational education be developed which will help cultivate graduates of high quality who can adapt to the social and economic development and will be welcomed by the employers. Conversely, the actualization of the curriculum is a dynamic process. Each step, such as setting the specialty, developing the curriculum, selecting and compiling the teaching material, is done dynamically. The curriculum is not only the carriers of special knowledge, but it is also a dynamic and open process. The organization of the curriculum no longer sees the self-closed subject as the center, but continually interacts with other subjects and develops in a comprehensive and interdisciplinary direction. The content of the curriculum no longer remains unchanged, but is adjusted continually according to the requirements of new knowledge and posts and the growth of technology. The process should be advanced circularly as follows: Evaluate the post demands, develop the curriculum, select and compile the teaching material, actualize the curriculum, evaluate and feed back, revise and adjust⁷ (Wu 2007).

3.4.2 Process of Curriculum Development

3.4.2.1 Work Out a Whole Plan

The starting point of vocational curriculum development is to decide what new problems and tasks curriculums will be faced with. Appropriate strategies should be adopted according to the character of the new problems and tasks and have the development of the theory and practice of curriculums in mind. If we reform by getting rid of the past practical experiences, then it will lead to the simple repeat of what has already been developed. So before deciding the curriculum development plan, we should collect all kinds of research and practice information, and write out the fundamental analysis report. Making a general program of the curriculum development is the key to guide all concrete sub-tasks of the curriculum development. Setting the goals according to the analysis of the curriculum problems and tasks and setting the guiding idea and method of the curriculum development according to the analysis of the curriculum research and practice are the two parts of basic content of making the curriculum outline. The goals should be clear and concrete, and the method should be practical.

3.4.2.2 Do Curriculum Investigation

The scope and depth of curriculum investigation affects the quality and efficiency of the following tasks. First, it needs sharp insight into the requirements of the curricu-

⁷Wu Xueping (2007). *Basis and Application-Study on the Policy of Higher Vocational Education*. Hangzhou: Zhejiang Education Press: 34–201.

lum, that is, to find out the condition of the posts through investigation: What posts are reduced or have even disappeared, what have been enlarged or even polarized, what have overlapped with other posts, etc. This information is very important for the optimization of the curriculum structure. The next task is to investigate the changes in the demands of the posts. The key occupation is always the one changed most or the new occupation. In the investigation, we should not only know the change of quantity of post task, but should also know the change of the task process. The new specialty only needs the above two kinds of investigation, but the old specialty needs to do some supplementary investigation to find out what content is effective and what is redundant. After a comprehensive analysis of the all investigation results, we can set the curriculum criteria. This is the combination of the occupational demand, education source and education regulation. This is also the result of changing occupational activities into education activities. The curriculum criteria should include the following parts: The first part is the curriculum goal, counterparty to the traditional training ones, this needs to be concrete and made clear. The second part is the table of curriculum content, which is to translate the goal into concrete knowledge, abilities and attitude. The third part is the criteria to accomplish the goal including the criteria of goals and the criteria of mastery of sub-content.

3.4.2.3 Select the Content of Curriculum

The selection of the technical and vocational education curriculum content not only selects and compiles the teaching material, but also analyzes the new technology, learning experience, and the vocational life. Then we should decide what is to be accepted and what should be gotten rid of. The criterion is the curriculum outline. The selection of occupation activities is not only the embodiment of the basic goals of vocational education, but is also necessary to the teaching process. We can choose the occupation by the concrete criteria such as activity item, activity process, and activity environment, etc. We can also use the abstract criteria such as activity experience, usual problem solving strategies, ability and technology promoting ways and strategies and so on. Knowledge choice is difficult in vocational education. As for the logical system of each subject, unlike the complex occupation life, the subjects are generally precise. Each subject has its own key and difficult point in the eyes of experts. It is doubtful whether these systems, key and difficult points are in line with the technical and vocational education goals and the curriculum outlines or not. Subjects and occupations are actually different. Subjects pay more attention to the discovering of knowledge and the integrity of its knowledge system, but occupation work is about the application of the knowledge, solving the practical problems and the strategies and skills of fully accomplishing the task. Therefore, it is necessary to investigate the knowledge, key and difficult points by breaking the sector of subjects. This is a new difficult point for the teachers and subject experts. However, there are still some strategies we can use, for example, first, analyze and decide the knowledge task, then decide the type of the knowledge, finally make a choice. Those two kinds of choice belong to the choice of social culture while the choice of learning

experience belongs to the choice of psychology. This kind of content attracted little attention in education in the past, and also there was little experience in this field; and therefore it restricts the effect of the transferring of social culture. To make a choice of the learning experience, we can use three methods as follows: First, using the psychological method to analyze and choose the learning method from the subject content like the logic regulation, idea, expression, and the method of data analysis. Second is to do an investigation of the occupations to make clear their experience of knowledge learning, problem solving and technology promoting, third is to conclude the past teaching experience and research results, to do reform of teaching and to experiment continually on the learning method. The last task of curriculum content choosing is to gather and optimize the above information and to establish a data-base. This data-base is very large and needs to be sorted out and categorized.

3.4.2.4 Build the Structure of Curriculum

The establishment of curriculum structure includes not only building several big curriculum groups, but also building the basic subjects, and the arrangement of subject content. It can actually solve the problems of the relation between occupation activities, subject knowledge and learning experience. Then, analyze each part of the content of the curriculum one by one to set their sequence structure. It solves the storing and drawing problem of the curriculum content. Numbering the content of the database can mostly solve the problem of the sequence of teaching and learning. While arranging the sequence, it is necessary to do the relative analysis of the projects in the vertical and horizontal dimensions so that each project in the content database can be set in a suitable position with vertical and horizontal dimensions. Besides, it is better to pit the same kind of content together in order to build the knowledge section, occupation activity section, learning experience section, etc. So, all these curriculum contents make up a coordinated whole. Finally, building the curriculum structure not only helps to compile the teaching material directly, but also helps to decide how to divide the working task and how to evaluate the students' learning.

3.4.2.5 Compile Curriculum Files

The compiling of curriculum results in making a series of files, such as the explanation of curriculum structure, the relation between its different parts, the goals, concrete criteria, actualization of each subject, file and teaching strategy, expression of subjects' content, and the evaluation plan of curriculum results. It is important to design the compiling rules and revise the files. It is also important to check and guide it in its compiling process. In this process, it needs to collect information, receive advice and do in-depth analysis. The curriculum experiment aims at discovering and solving the problems. We don't need to praise the advantages of the curriculum, but to find its disadvantages and revise it to make it perfect. And then to write out the experiment report after the experiment is completed discuss the effect of curriculum

actualization, list the difficult points, surprising gain and the new requirements of the experiment; and give advice as to where revising is needed. The last task is evaluation. It needs far sight to see the future, and look deep into the whole curriculum development system. Its goal is to evaluate each sector and its relationship to other sectors in order to show the features of the curriculum model. The overall goal is to promote the whole technical and vocational education reform⁸ (Wu 2007).

3.4.3 Main Models of Curriculum Development

Research on vocational curriculum model in China has been increasing these years and the application of vocational curriculum model in technical and vocational schools is developing gradually. Currently, the technical and vocational education in China has five kinds of modules: Subject-based model, platform model, module-based model, vocational group model and integrated model.

3.4.3.1 Subject-Based Model

This model divides curriculum into basic course, basic specialized course and specialized course according to the knowledge system of the subject, or divides it into common basic class, basic specialized course and specialized course and professional orientation course, which is called three-stage or four-stage model.

For a long time, subject course has been holding the leading status in curriculums. In the opinion of historical materialism, the subject course plays an important role in transmitting the culture and experience, and in promoting students' knowledge acquisition and intelligence development, and in evaluating students' learning level. That is why this model still prevails nowadays, and has the rooted status. So, it is necessary to fully analyze this model, only after getting the exact impression of its features, existing problems, and how we can know the effect of this model in the technical and vocational education development. Then we can develop new models with power and goals.

The subject-based model of technical and vocational education takes along the traditional model in bachelor's level teaching, which constructs knowledge based on subjects. This model emphasizes (1) the systematic transmitting of knowledge: Irrespective of whether they are essentialists, eternalists or structuralists they all agree that "education basically means knowledge transmission. (2) Compiling curriculum in the logic system of subjects' knowledge. Those people center the subject emphasis to organize the curriculum content with the subject's logic sequence in order to put students' learning activities together effectively and this has a cumulative effect. They pay more attention to the logic division and sequence arrangement in content and

⁸Wu Xueping (2007). *Basis and Application-Study on the Policy of Higher Vocational Education*. Hangzhou: Zhejiang Education Press: 34–201.

the subjects' logic sequence of itself. Through this way, they believe they can realize four "benefits" (i.e. to master system knowledge, definition and principle of the subject; intelligence training; develop students' rational mind; and also the gradual development and promotion of students). (3) The goal of curriculum is intelligence training and development. The subject standard scholars try to train the students to be rational people, to promote social technology development through intelligence and rational training. (4) Divide knowledge into different value ranks. In these scholars' opinion, knowledge has ranks which can be of picked or discard value in the selection of curriculum content. The knowledge will be different between curriculum weaving and actualization.

In looking into the development process of curriculum theory and practice, it is to find the balance among the subject development, demand of students and demand of society. As for the subject-based curriculum, it emphasizes the transmission and development of subject knowledge, but neglects the psychological demands and social practical requirements. This is the crux of the problem, which manifests in (1) the simplification of the thinking model. It simplifies the relation between mastery of knowledge and students' development, and does not realize that a person's development is the result of several factors. (2) It emphasizes the specialization of knowledge, neglecting their relation and integrity. As a whole, subject-based curriculum emphasizes that students must master the systemic subject knowledge, even to be an expert on some subject, so it is necessary to compile curriculum content according to the logic of the subject. But this way cuts part the relation between subjects. Actually, we need different knowledge when solving a problem. Especially nowadays when the technology and culture develop quickly with subjects crossing, mixing and permeating with each other, merely subject-based curriculum will not suit the demands of knowledge transmission and development. (3) It emphasizes the abstraction of knowledge, neglecting its application. Subject-based curriculum puts undue emphasis on the "eternal unchanging value" of knowledge, the importance of "element" and the basic structure, definition and principle of subjects, which leads to the result that students only understand the definitions, principles and rules, but are kept away from the colorful social activities and their practical demand. So, students do not realize the value of practical knowledge and they will lose their interest in studies. On the other hand, the knowledge they learned lacks professional feature and job-hunting guidance because students do not know how to analyze practical problems with the knowledge, do not see the relation between the knowledge and their practical jobs, and do not see the suitable occasion and context where the knowledge is applied. This kind of curriculum will not be accepted by the students, and neither by the society. In addition, persons trained in this way will not fit into the society. (4) It emphasizes the transmission of knowledge, neglecting the comprehension and creation of teachers and students towards the knowledge. As the subject-based curriculum prizes highly the system of knowledge and the heritage of human culture, it requires students to recite the knowledge and emphasizes the academic standard. Putting undue emphasis on the rational and intelligence development value of knowledge will result in neglecting the development and creation of knowledge meaning. These factors will cause students to lose their happy experience with studies. (5)

It emphasizes the subject experts' control of curriculum compiling, neglecting the important role of community, corporations, students, teachers and parents. This trend of thought subordinate to the equipment rational values of science, which emphasizes the universal knowledge delivered to students must be truth and it is mastered by a few elites and experts. So, curriculum compiling is led by experts while community, trade and corporations are not encouraged to be involved, and their demands will not be considered at all. In fact, they are the concrete demanders; they have their own value demands and subjective activity which should not be neglected in practice. Neglecting them, the curriculum goals will be difficult to achieve and the teaching quality will be difficult to ensure. (6) It emphasizes the rank of knowledge, neglecting the integrity of them. As the subject-based curriculum has limitations of itself, exponential in different periods to emphasize either social science or natural science, and they divide knowledge into different ranks, however in fact there is no rank between knowledge. On the other hand, the social requirement of persons are multi-aspects and multi-levels, knowledge has different value to different people. Curriculum should be multicultural but not single, only in this way can the society demands be met.

As the attention and research of the technical and vocational education curriculum model is enlarged, the subject-based model has changed a lot, and its leading place is no longer secure. The technical and vocational education curriculum is developing in different levels, which reflects the technical and vocational education rule, and emphasizes industry and corporation demands. Though academies emphasize practical teaching and training students' practical abilities and integrity quality in setting the curriculum, the subject-based curriculum has not broken through the logic relation, curriculum construction and knowledge system of the subject. Technical and vocational education is still affected by this subject-based trend.

3.4.3.2 Platform Model

The platform curriculum model attempts to build a "three-rank platform" or "four-rank platform", arranging the sequence of common basic courses, specialization basic courses, specialization courses and special courses according to a traditional teaching plan. This model designs curriculum with the academic category in order to enlarge the academic base. The common basic course platform mainly enlarges the subject relative base, increasing courses on social science and education for all-around development. And a specialization basic course platform is to build a united big category of academic curriculums through linking several specialization basic courses together and rebuilding the teaching content. The specialization course platform provides different groups of academic curriculum which can be chosen freely by students and can promote their individual development. There are obligatory courses and elective courses in each platform. This model enlarges the academic base and increases its flexibility which is good for students' development and the change of occupation. However, in a word, it is only a reform of the subject-based model.

3.4.3.3 Module-Based Model

After analyzing the basic knowledge, basic quality and different professional skills of some post or post groups, it puts curriculum into different knowledge modules and ability modules which center on ability. This kind of model is called a module-based model. In this model, subject knowledge system and professional ability system are two relative and independent parts, which separately leads to subject knowledge module and professional ability module. Subject knowledge module is built for several relative vocations, including the common basic knowledge such as mentality course, foreign language and computer basic appliance course, math and technological course, social science course, and specialization knowledge such as specialization basic knowledge, specialization theory course and so on. Professional ability model mainly includes experiment, design, and post training etc. Besides, some training module is provided for professional skill examination. All the knowledge modules and ability modules can be integrated freely towards different professional posts. This model takes in some modern curriculum theory, trying to break through the three-part curriculum model, and it emphasizes post analysis and skills training. But it is still affected by the subject-based curriculum system. Different modules are divided artificially which will not solve the fundamental problems of vocational curriculum model.

3.4.3.4 Vocational Group Model

This model is to put some relative vocational posts together, analyze the common basic knowledge and skills they require, and organize them systemically. Students can learn the common knowledge and skills of some vocational group at first and then to learn some special vocational skills and knowledge. At last the learning scope will be reduced into different vocational post skill training.

This model can be divided into three relative but different stages based on the analysis of the knowledge, ability and quality that the vocational post requires. The first stage is for the study of vocational basic knowledge. This stage emphasizes wide base, which means the teaching content is the common knowledge and skills required by groups of relative vocational posts instead of a particular one, in order to prepare for post transfer and further studies; The second stage is for the study of vocational skills. In this stage, students not only learn different specialty theory and knowledge but also train the skills. The study of specialty basic theory and vocational knowledge must be finished at the same time in this step, which is the most important part of vocational education, so the teaching content needs to integrate relative subjects logically. The third stage is for the special post skill learning. In this step, education is divided into several specialty directions on the basis of theory study and skill training in order to train one or more special skills for students. This model is developed for Chinese secondary vocational education which absorbs the advantage of the foreign technical and vocational education curriculum model. Its strongpoint is the emphasis on the reform of the curriculum structure, students' choice, and corporation and post

requirements. But in this module, the compartmentalization of different vocational groups is done with school or personal experience which lacks veracity. And it pays less attention to the training of social ability than to the specialty ability, so that this module is still the tentative model in the process of Chinese curriculum reform.

3.4.3.5 Integrated Model

This model integrates the above models into a most excellent model after taking their advantages and concluding the common regulations. There are four parts in this model: Professional moral, professional basic knowledge and skills, professional knowledge and ability, professional developing knowledge and ability. The features of this model are: First, it aims to train students' ability of obtaining employment. Specialty-setting needs to adapt the various requirements of society. Secondly, changes the academic subject into skill subject or ability subject. Thirdly, combines the subject and activities into a flexible unit. The curriculums can be divided into knowledge module, activity module, attitude module and integrated module. Fourthly, actualizes the goals with the steps of "base—choose direction—specialization". Yet, this model has some weaknesses: The system of model is not clear, the knowledge module and attitude module are not very well mixed. This module is successfully actualized in secondary vocational schools, and whether it is suitable for high vocational schools still needs research⁹ (Hao and Ren 1999).

3.5 Reform of Technical and Vocational Education Curriculum

- The reform of curriculum is the key and starting point of teaching reform which is also the crux of vocational education's improvement. By the reform of curriculum, ideas, training targets and talent training modes can be achieved. Since 1999, the Vocational and Adult Education Department of Ministry of Education has held a series of seminars on the reform of curriculum, pooling various opinions and proposed the 21st century oriented guidance, targets and measures as well as teaching material construction. Besides, some key documents related to the curriculum reform were issued, including "Principles of the Ministry of Education on the Formulation of Secondary Vocational School Teaching Plan", "Further Reform of Secondary Technical and Vocational Education in the Process of Promoting Quality Education", "Opinions of the Ministry of Education on Deepening the Teaching Reform of Secondary Vocational Education", "Decision of the State Council on Accelerating the Development of Modern Vocational Education", "Notice on the Construction of Modern Vocational Education System (2014–2020)". Based on

⁹Hao Xinseng, Ren Changrong (1999). Analysis on the Reform and Development of Chinese Vocational Education. *Journal of Northeast Normal University* (2):41-43.

comprehensive quality and ability, the core lies in standardizing teaching in secondary vocational schools by carrying out “the plan of 21st century technical and vocational education reform and teaching material construction” in order to build an “intersection” system connecting employment, educational development and talent raising, and 80 basic and wide-covering teaching documents, 1000 kinds of demonstrating textbooks with new knowledge, technology, techniques and methods as well as more than 100 kinds of multimedia teaching software which were set out in the state level. Nowadays, on-line courses are available in schools and colleges. In 2014, there were 54.5 on-line courses in each technical and vocational college on average, an increase of 8.9% over the previous year. The ratio of students with computers provided by colleges is 18.9 in every 100 students.¹⁰ To guarantee smooth running, the National Secondary Vocational Education Guiding Committee and National Vocational Education Teaching Material Examination and Approval Committee were set up under the Ministry of Education. In addition, a constructional fund was also established to provide relative conditions¹¹ (Hao and Ren 1999). These approaches made it possible to set up the new curriculum which aims at helping students to understand the work process and gain initial experience, that is, students experience the whole “work process” including task-taking, independent working, presentation and evaluation, thus developing their abilities to solve complicated problems in the work. By introducing the learning concept of Action Orientation, e.g. using “complete action mode” to replace “partial action” mode in learning process, students can finish assignments based on external regulations¹² (Qin 2013).

3.5.1 Context of Curriculum Reform

3.5.1.1 The Breaking Point of Technical and Vocational Education Curriculum Reform

The traditional technical and vocational education shares a feature that is targeting the training of special employees for some posts or professions so that related professional and curriculum arrangement, teachers and facilities should be under this goal. This method was called post-oriented mode. With the development of the market economy, its dynamic feature requires technical and vocational education to take a more positive way to adjust and offer service. In this regard, the post-oriented mode can no longer follow the changing trend of market requirements. Smooth progress

¹⁰China Education Overview (2014).

¹¹Hao Xinsheng, Ren Changrong (1999). Analysis on the Reform and Development of Chinese Vocational Education. *Journal of Northeast Normal University* (2):41–43.

¹²Qin Xin. Research on Comprehensive Teaching Design for Engineering Courses in Higher Vocational Colleges Based on the Integration of Work and Learning. *Modern Vocational Education*, 2013(6):24–26, 45.

can be made in technical and vocational education by adopting market mechanism in the adjustment of specialty provision, curriculum structure and teaching content. Faced with the changing economic system, to maintain survival and development of the schools, a new teaching mode has been built. Compared with the former single target mode, the new one places increased emphasis on cultivating abilities for more posts. From it, the widening trend could be identified which serves as a breakthrough of secondary technical and vocational education reform.

3.5.1.2 The Catalyze of Technical and Vocational Education Reform

The target of technical and vocational education is to cultivate comprehensive developed personnel in line with social requirements. With the scientific and technological progress and the productivity development, the requirements for overall developed talents are changing, this also requires the adjustment of curriculum targets.

First of all, with the advancement of technology, many interdisciplinary posts and professions come into being. The technological progress also affects significantly the kinds and contents of posts. The techniques and these new posts and professions have exceeded the traditional professional boundaries.

Secondly, the transformation of labor organization demands higher comprehensive quality. Workers have to deal with more personalized requirements instead of simply repeating tasks thanks to the transformation brought by new technology. Besides some techniques, know-how, workers also need to communicate with others, shoulder responsibilities and make innovations. Positive participation, concerns, cooperation, responsibility and creativeness are required to achieve overall quality management. Due to more communication in today's world, there's higher demand for the abilities of interaction, quick thinking, and pressure bearing.

Therefore, the technological development and labor organization transformation are the most energetic, fundamental, far reaching factors which call for modern technical and vocational education reform to keep an eye on raising overall quality of students, such as public relations and cooperation, and improve the humanistic education simultaneously.

3.5.1.3 The Guidance of Vocational Curriculum Reform

The ability standard takes raising ability as a target of education. The ability here refers to the comprehensive quality which is in line with social requirements. There are three kinds of abilities of vocational school students, namely, general ability, comprehensive professional ability and professional ability which interweave with each other forming a complex quality structure—comprehensive professional ability. In order to implement the idea of ability oriented, curriculum reform must be carried out to construct an integrated curriculum system with student-centered targets instead of knowledge-centered, with experts from enterprises providing

guidance instead of experts from academia, with learning as the major method instead of teaching¹³ (Deng 2002).

3.5.2 Contents of Curriculum Reform

It is clarified in the No. 1 document the Suggestions on Further Reform of Secondary Vocational Education in the Process of Promoting Quality Education, issued by the Ministry of Education that the reform of secondary technical and vocational education should be deepened and modern curriculum modes be unfolded, especially those module curriculums with credit system as well as the exploration and practice of comprehensive curriculum. Efforts should be made to connect teaching knowledge and raising ability, to improve the ability, adaptability and practicality building a curriculum system considering the demands of economic and social development as well as individual requirements. In the document, a close relationship could be identified between the reform of curriculum mode and that of the teaching management system. Module and comprehensive curriculum serve as the inevitable choice for the credit system¹⁴ (Jiang 2001).

3.5.2.1 Reform of Teaching System—Credit System

The credit system is a teaching management system which aims at measuring effect and performance of students' studies to help vocational schools realize their targets. It has been adopted by an increasing number of managers, students and parents for its flexibility, multiple choices and independent ability building. In July 2005, taking the opportunity of the establishment of the Teaching Management Seminar of China Vocational Education Committee, the forum of vocational schools' credit system was launched in Guangzhou. More than 70 people from the national technical and vocational education administration, teaching research departments and various schools attended this forum, and 16 schools addressed the forum. They concluded that the use of theories, and the communication of first-hand experiences about the credit system, provided good examples for extending this system nationwide.

The city of Guangzhou is the political, economic and culture center of Guangdong Province enjoying great advantages of reform and opening up policy. It has achieved impressive success regarding technical and vocational education reform and development. Senior high schools were universal in Guangzhou as early as 1999. Since then, secondary technical and vocational education has transferred from quantity to quality and efficiency. And some experience has been accumulated about the credit

¹³Deng Yingying (2002). Curriculum Reform is the Safeguard to Improve the Development of Secondary Vocational Education. *Forum of Vocational Education* (8):21–23.

¹⁴Jiang Naiping (2001). Credit System, Flexible Course and Course Management. *Vocational Education* (19):11–13.

system. In 1999, the teaching lab of Guangzhou Education Bureau and a number of secondary vocational schools have organized the “the establishment and implementation of credit system in secondary vocational schools in Guangzhou” task team, in which 18 relative schools took part in it. In 2003, based on the practical experience, the credit system was adopted by all key secondary vocational schools in provincial level.

In the process of academic and practical exploration, Guangzhou has mainly made efforts in the following six aspects. First, conduct curriculum research featuring modularization, integration and diversification to improve personality development of students. Secondly, investigate stratified teaching modes and strategies. Thirdly, study elective courses with local, academic and professional characters. Fourthly, improve the research of teaching management of the credit system, the key points are elective courses, tutorial system and re-study system. Fifthly, studying score evaluations suited to the targets and requirements of secondary vocational schools. Sixth, make comparative studies on learning methods and results¹⁵ (Huang 2005). In the last few years, efforts have been made in teaching reform, series of campaigns were launched to promote dialogues between vocational education and industry, students are encouraged to participate in skill contests to demonstrate their practical abilities.¹⁶

3.5.2.2 Reform of Curriculum Structure—Wide Base and Flexible Module

Wide base demonstrates the demand of talents’ knowledge structure in today’s world. Recently, with the application of information technology, the technical and vocational education structure changed. First, rapid change could be seen in the professional structure. According to the Outline of the National 10th Five-year Plan, by 2005, the percentages of workers in primary, secondary and tertiary industry were 44, 23 and 33% respectively with the number of primary industry dropping sharply while those of tertiary industry increased rapidly. There’s a conservative estimation that during the 10th five-year plan, the average new posts in the tertiary part reached eight million per year. Second, the posts in traditional industry decreased, instead, more posts were created in the newly-emerging industry. Third, the non-material departments’ structure changed rapidly. In the tertiary industry, the manual labor posts transferred to knowledge-intensive, high-tech ones and the professional division was more comprehensive. Fewer people took part in manual labor activities while more engaged in knowledge-based posts. Even in traditional posts, workers have to improve their knowledge and skills rather than doing physical work applying unchanged techniques. Fourth, the basic skills in different professions tend to be uniform. These changes call for new requirements for workers basic knowledge, pro-

¹⁵Huang Xiaowen (2005). Credit System—The Actual Need of VTE Reform. Chinese Technical and Vocational Education (25):37–39.

¹⁶China Education Yearbook (2013):626.

fessional backgrounds, so general elevation of students' basic abilities has become a trend in curriculum reform in secondary vocational education.

Flexible module attaches great importance on employment flexibility. First, the specialty is flexible. Schools could build their own post-plot based on current majors and they could also launch new majors for markers. Second, the level is flexible. Personalized curriculum targets could be set according to students' different culture backgrounds, abilities. Third, the course is flexible. There are several independent modules, such as common courses, general professional courses, special professional courses, and elective courses. All these modules can be combined to keep pace with the changes of certain courses. Fourth, the main body is flexible. Students could make their own choices and become positive learners. Fifth, management is flexible. Students can accomplish their learning in several phases, which is similar to the credit system. In fact, wide base and flexible module should be managed under the credit system. If there's no matching credit system, flexible module has no way to be realized¹⁷ (Sun 2005).

3.5.2.3 Reform of Curriculum Mode—Comprehensiveness

The social and economic development in our country, especially the economy and education in relatively developed areas make higher expectation of workers' quality and ability. And ordinary people also expect that graduates from secondary vocational schools can both be employed and prepared for higher learning in colleges or universities, and further, lay a solid foundation for life-time learning and future development. These put forward an objective demand for the reform and comprehensive curriculum. The comprehensive curriculum in qualified schools is an exploration to produce diverse ways to run schools considering social demands. It is useful to producers, managers and labors in the front line and to those who seek after further learning. Taking professional and teaching analysis as the foundation, comprehensive curriculum includes professional knowledge, skills and attitudes. The main advantages are: Improving students' overall quality, adaptability and teaching efficiency. It is an effective solution to the contrary between required and elective courses brought by the credit system. And the disadvantages are that it calls for relatively high quality of teachers and it is difficult to put in practice. Currently, the teaching cultivating methods fall far short from the requirements.

In recent years, some provinces and cities have conducted examinations of comprehensive curriculum in secondary vocational schools during the further reforms in this aspect. And the following requirements must be included:

First, the length of comprehensive curriculum schooling system is mainly three to four years. And schools can adopt flexible ones and credit system according to the needs.

¹⁷Sun Zhihe (2005). Study on the Relation of Credit System and the Curriculum Reform of Secondary Vocational Education. <http://www.hvae.com.cn/jiaoxuegaige/ShowArticle.asp?ArticleID=258>.

Secondly, the establishment of a comprehensive curriculum could refer to general professional majors. Efforts should be made to set some qualified, skilled and complicated majors so as to improve students' adaptability.

Thirdly, the reference of comprehensive curriculum could be the requirement of higher vocational technical college and posts, or the course outline of secondary vocational schools issued by the Ministry of Education, or basic teaching requirements of senior high schools. So basic culture basic courses could be conducted. At the same time, courses for professional knowledge, abilities, innovative spirit and capability should be launched to provide guidance.

Fourthly, the comprehensive courses should place emphasis on professional education to avoid running technical and vocational education as probationary education for entering a university.

Fifthly, comprehensive courses should adopt multiple, flexible teaching management and module systems, combining required and elective courses in order to provide more choices for students. The classes adopted with comprehensive courses could be formed after the first two years based on different demands, such as further learning, hunting for jobs and individual conditions. By distributing or taking the credit system, we should endeavor to deepen the training of culture bases, professional knowledge and abilities¹⁸ (Dong 2001).

3.5.3 Tendency of Curriculum Reform

With the continued social development, technical and vocational education curriculum should keep in step with the trend. And the technical and vocational education curriculum in China shows the following features¹⁹ (Wu 2007).

3.5.3.1 The Target of Curriculum—Transfer from Certain Skills to Comprehensive Ability

The technical and vocational education in the past focused on training skills, and preparing students for jobs. However, today's working situation challenge this target. It is almost impossible to only engage in one career and individuals can not predict what kind of work one will take. In this regard, those mastering a particular kind of skill, face severe survival and developing challenges. So it is necessary to learn some basic abilities so as to cope with the changes in posts. At the same time, the concepts such as "life-long learning" and "sustainable development" have been rooted in the

¹⁸Dong Chengren (2001). Suggestion on Developing the Synthetical Curriculum in Some Secondary Vocational Schools Promulgate by the General Office of the Ministry of Education. Chinese Technical and Vocational Education (10):56–58.

¹⁹Wu Xueping (2007). Basis and Application-Study on the Policy of Higher Vocational Education. Hangzhou: Zhejiang Education Press, Hangzhou: 34–201.

hearts of the people. Cultivating overall quality and promoting all-round development have become general goals of vocational education. Greater emphasis was attached to individual development, in this circumstance, the curriculum focused on students' adaptability, overall ability and innovation spirit as well as their motions, attitudes and values instead of professional skills. This trend will certainly promote integration of many curriculum concepts. The curriculum target has become more multiple, one traced after "subject concerned", "ability-concerned" and "personality-concerned".

3.5.3.2 Curriculum Content—A High Level Integration Between Profession and Academy

In 1991, "World Bank on technical and vocational education and training" rewrote the relationship between general education and technical and vocational education as complementary rather than replacement, demanding solid general education before technical and vocational education and vocational schools should focus on basic education. The emerging integrating curriculum and professional courses differ from "turning vocational college into ordinary college" and "turning ordinary college into vocational college." The latter was just injecting some content into each other's courses while the former was integration rather than two independent systems. First, from the technical and vocational education perspective, the rapid development of science and technology has resulted in more high-tech posts which demanded higher quality workers. To prepare students for further learning while working, many employers also require better understanding and researching ability. Increasing academic contents in professional education will make it easier for students to get into universities. And more qualified talents will be interested in technical and vocational education with a sound base to deal with problems and make innovations. Second, from an academic prospect, the integration will make teaching more suitable for job hunting, stimulating learning motivation and lowering dropout rate. Considering these aspects, many experts proposed this integration to improve academic courses through vocational courses.

3.5.3.3 Curriculum Structure—Demonstrate the Openness and Flexibility of Module Courses

The essential part of module courses is a learning package, namely, according to certain goals, different studying unit could be chosen. Each module includes several units by which training is conducted. And every learning package includes learning targets, materials, supporting materials and assessing standards. The distinct features of module curriculum are openness and flexibility. First of all, in the studying process, modules could integrate with one another depending on problems to be solved. So students can make their own choices based on different interests. Second, the learning material in modules could be reorganized by teachers with the social and economic development so as to keep pace with the changing times.

3.5.3.4 Curriculum Implementation—Transfer from Teaching to Learning

It has been identified in many research projects that comparatively better professional ability was obtained through experiential knowledge rather than theoretical knowledge. Although students will take part in some practical courses, they're different from the actual situation. In order to improve the students' professional ability, schools should cooperate with companies adopting integration between teaching and producing. It is an inevitable trend for reform.

The transfer from teaching courses to learning courses means that students should learn more knowledge and skills. It emphasizes less on teachers' authority than acting as a guide. Teachers will be part of the resources for students, become supervisors and organizers. The learning courses focus on personality so individuals could have distinct contents and schedules supported by these improved systems, the results of learning (formal or non-formal results) will be accepted without doubts.

3.5.4 The Case of Curriculum Reform—Analysis of Reform of Secondary Technical and Vocational Education in Zhejiang Province

Since 2006, the MoE has initiated a national program to improve the quality of higher vocational education. 100 exemplary vocational colleges were identified and supported with special budget. In framework of this program, Sichuan Vocational and Technical College of Communications developed new curriculum in form of Learning Field, with a slogan of "combining learning with working" The process of curriculum development is based on the methodology of comprehensive work analysis, in order to find out "typical professional tasks", in the hope of better answering the questions of how to identify the qualification demands and comprehensive vocational education goals and how to identify the content of occupational learning.

In Zhejiang Province, with continuous economic development, technical and vocational education has achieved impressive success. However, an inside view shows that some deep problems still remain unsolved which are related to sustained and healthy development of vocational education. And the wide gap between talents and market demand is the reason behind it while the curriculum was the direct factor. The Zhejiang Provincial Government held a technical and vocational education work meeting and issued the Suggestion on Improving Technical and Vocational Education Reform by the Provincial Government which served as a milestone. In order to improve quality and meet the requirements of professional talents, Zhejiang Province has carried out "six action plans of technical and vocational education in Zhejiang." The curriculum reform of the provincial secondary technical and vocational education is one of the plans launched in the beginning of 2007. Considering the actual situation, numerical control technology application, costume design and

techniques, auto application and maintenance, and tourist service and management were chosen as the first set for trial, related closely to the local economy and the embodied local features. The past year has witnessed phase achievement in building new modes as “core courses plus teaching projects” in an energetic, reliable, scientific, precise, practical, and innovative way. Based on acquired experience, Zhejiang Province has carried out further curriculum reform on secondary vocational schools beginning in September 2008, with plans for continuing further curriculum reform to September 2011.

3.5.4.1 Context of Curriculum Reform of Secondary Vocational Schools in Zhejiang Province

The curriculum mode concentrated on subjects that did not fit social and economic transformation. The goals of vocational schools are to train professional abilities including special abilities, general abilities and social practice abilities. But the subject mode doesn't adapt to these goals. It over-stresses the integrality of subjects; course learning with theory and practice are separated and there is very little utilization and direction. The students under such modes are good at mastering certain theoretical knowledge or skills but can not go directly to work without retraining. The abilities of learning new materials, resolving problems, communicating with others and improving qualities are the essential part for career or life-time development. But these abilities can not be obtained from subject-centered courses.

The curriculum mode concentrating on subjects doesn't fit students' learning actuality. Affected by traditional concepts of talents, the students in secondary vocational schools are considered as “losers” of high school education. Their cultural basis are generally weak with language, symbolic logic and cognitive ability which fall short of standards of subject curriculum. Currently, the subject-centered mode and actual situation are detached with each other making it difficult in teaching, learning and results in less confidence. In this regard, it is an urgent task to explore and build post-concerned curriculum mode which is suitable to the overall development of students.

The achieved results lay a solid foundation for further curriculum reform. In 2006, Zhejiang Province has carried out four curriculum reforms, namely, numerical control, costume, vehicle repair and tourism. Researches have been made on several core aspects, such as what to teach, how to teach and what to learn and how to learn. Based on the actuality, professional development and market demand, the study team has established “teaching guidance” and “course standard” for the four majors. Appraised by the experts' panel, the results were greatly innovative and practical and were in the leading position nationwide. These successes provide a good foundation for further reform.

3.5.4.2 Contents of Curriculum Reform in Zhejiang Province

Zhejiang Province has strong thoughts about reform focused on training skills with material exploration as the main body, subjects design as a key point which is a new secondary education curriculum mode, that is “general courses plus core courses and instructional projects” featuring “innovation, practice, advance”. The core courses were set according to the new demand of cultivating professional talents. Centered on key skills, core courses were identified considering the width and depth of knowledge. The essential part of the instructional projects is the practical course, so the priority is a working task. In this process, relative practices form the steps including technical rules, environments, and judging knowledge. The main utilization of relative theoretical knowledge is to improve students’ understanding further and to develop their professional abilities. In order to organize easily, the number of core skills should be about five, courses can be five to eight, and teaching subjects can be about 100 including 60 compulsory and 40 selective ones.

It is necessary to focus on the establishment of recessive courses, giving full play to material, social and culture resources in schools, concentrated on culture building and cultivating students’ ideology, attitude, will, and motion. Value concept should be emphasized so as to cooperate with courses.

The school-based curriculum should be intensified. The secondary vocational schools should take local economy, science and companies into consideration with traditional advantages to improve curriculum itself, teacher’s quality and student’s development. The motivation of teachers and employees should be stimulated and resources in school, company and society should be integrated. Drawing upon foreign lessons in terms of curriculum and material to form some kind of school-based curriculum combined with national, provincial requirements as well as local features focused on comprehensive practice. To explore various teaching materials, such as loose leaf lecture sheet, multimedia courseware, cards, audiovisual products and teaching aids.

It is necessary to enhance the construction of “double teacher type”. By special topic training, theme training and problem-solving training, teachers quality and exploration ability could be improved. Strengthen the connection between training and producing by sending teachers to companies to get more professional practical skills. Setting up a teaching and researching system centered on school-based research and curriculum so as to improve teachers research ability and innovative spirit transferring them from traditional “knowledge facilitator” to “tutor”.

It is necessary to improve teaching methods. The teaching methods in secondary vocational schools should emphasize ability and skill training with modern technology to formulate a system which boasts general knowledge, practical skills, theoretical and technical advantages and is good in improving quality.

It is also necessary to introduce the credit system. Elective courses should be set according to local features. Centered on students, the management and mutual recognition credit system should be set up and improved, respecting different characters. Students with their own backgrounds, interests, abilities and demands should be encouraged to acquire basic knowledge or skills for employment or further learning.

Secondary vocational schools should set up correct talent and quality concept and attach importance to evaluation in order to reflect students' learning experience. Discover and stimulate various potentials to help students to recognize themselves, and build up self-confidence. Efforts should be made to evaluate the learning process, to assess overall practical ability to reflect different intellectual types and levels. Written and oral testing, interview, observation, spot operation, execution, case analysis reports, results demonstration, evaluation, recording learning methods, self-judgment, a third party assessment etc. should be put into practice to build ability-centered, multi-main body and various curriculum evaluation system.

Implement further reform of the test content and mode of higher vocational school enrollment. The test outline should be in line with secondary school curriculum with principles to be propitious to recruitment, cultivating practical ability and correct guidance of vocational schools' reform. The evaluation of students overall quality should be strengthened. Administrations or research institutions in different levels should intensify scientific management, examination or evaluation of teaching to avoid simple arrangements and enhance the examination of curriculum to improve the level of vocational education.

Secondary vocational schools should formulate evaluation standards of teaching with the participation of headmasters, teachers, students, parents and employers to allow teachers to get information from various channels to upgrade their professional and practical abilities. In the teaching evaluation process, curriculum should be focused on, curriculum implementation and exploration should be considered as the key points of content.

3.5.4.3 Main Steps and Tasks of Secondary Vocational Curriculum Reform in Zhejiang Province

The reform in Zhejiang Province was carried out according to the work policy "guidance of theory, active exploration, all-round popularization", from September 2008 to September 2011, with the first four majors accomplished, 20 others would begin the reform. The details are as follows:

From September 2008 to September 2009, six majors were involved in the reform, namely, logistic, net maintenance and management, cartoon, operation and management of underground, electric and maintenance of underground and gardening.

From September 2009 to August 2010, seven majors were involved in the reform, namely, applied electronic technology, e-business, secretary, industrial and civil building, architectural ornament, cooking and environment project.

From September 2010 to August 2011, seven majors were involved in the reform, namely, electromechanical integration, ecological culture, chemical industry, office automation, water conservancy and hydropower, international trade, mass literature.

Besides these basic aspects, there are some other tasks:

Set up the procedure of curriculum exploration with the basic steps of "industry, profession, courses". It can be explained as: The research of industry or company (accomplish talent demanding reports and set training goals), the analysis of typical

working procedure (accomplish the research on post-clubs), the analysis of working task (accomplish the analysis of professional ability and build teaching projects), the settlement of curriculum (set the core curriculum and teaching items), the formation of teaching guidance and outline (write course standard and design general teaching goals), textbook compiling.

Conduct a survey on talent demanding and professional reform and draw the report of 20 majors in this regard from Zhejiang Province. The survey should depend on industry, company and its content should include the current situation of talent structure, the trend of profession, the situation of talent demanding and demanding of certain knowledge, relative vocational qualification, and employment. From a macro point of view to clarify the situation of industry, company and schools with which to make out a plan on reform thinking, goals and orientation.

To formulate the teaching guidance of about 20 majors of secondary vocational schools in Zhejiang, the guidance is a document issued by the government to standardize the establishment, teaching and evaluation of majors. It includes the goals, range, talent standard, professional ability, curriculum structure, course standard, skill examination, teaching arrangement and conditions etc. The professional guidance is guided by scientific outlook, employment and post demand so as to meet the demands of students' further development and the requirements of social and economic development.

To formulate the course standard for 20 majors in secondary vocational schools in Zhejiang. The course standard is the principle and requirement set by the government which serves as a reference to written textbooks, evaluation and examination. It also serves as standards to measure management. The core course standard should demonstrate the requirements of skills, knowledge, procedure and methods, motions and attitudes, values in certain aspects or fields. It also makes a regulation of core courses such as the nature, goal, design thinking, content structure and some suggestions.

Make a schedule to compile and complete textbooks for secondary vocational schools in several phases. The professional textbook should follow new "teaching guidance" and "course standard", and embody local features, new knowledge, skills, techniques and methods. To cultivate knowledge-based talents, we must streamline content to improve the practice character.

Set up a trial school for secondary technical and vocational education in Zhejiang. To select 50 schools with high level, good background, distinct features, positive in curriculum reform as trial schools to form a platform for curriculum reform and textbook compilation so as to further explore new systems.

3.5.4.4 Outcomes of Secondary Technical and Vocational Education Curriculum Reform in Zhejiang Province

After one year exploration, Zhejiang has established the mode as "general courses plus core courses and teaching items." The teaching guidance of four majors and standards for all the core courses has been formed. The details are as follows:

CNC technical applied specialty. There are six core courses: Basic mechanical processing, general mechanical technology, NC machine tools maintenance, NC programming, CAD/CAM software application, part detection and quality control.

About 100 instructional projects, such as AC contactors dismounting, valve pin processing, punch-matrix processing, soap box type processing, drawing bearing chock isometric drawing with AutoCAD2004, etc.

Costume design and techniques. There are five core courses: Clothing materials, basic costume design, basic garment drafting, basic clothing technology, and clothing produced.

About 100 instructional projects, such as skirts, jeans, suits, children's wear etc.

Automobile application and maintenance. There are five core courses: Auto conceptus, basic vehicle maintenance, general knowledge of automated machinery, electronic and electrical engineering, and vehicle construction and dismounting.

About 100 instructional projects, such as automobile decomposition and assembly, clutch replacing and assembly, transmission decomposition, steering mechanism disassembly and assembly, and making electronic circuits.

Tourist service and management. There are four core courses: Tourist culture, etiquette, tourist service and management, hotel service and management.

About 70 instructional projects, such as greeting, ordering dishes, watching, checking out, booking, and cleaning, etc.

3.5.4.5 New Trend of Secondary Technical and Vocational Education Curriculum Reform in Zhejiang Province

The recent reform in Zhejiang Province was carried out according to the work policy "Curriculum Reform of Secondary Vocational Education in Zhejiang Province" issued by Department of Education of Zhejiang Province in November 2014.²⁰

There are three stages of this curriculum reform. In 2014, some secondary vocational schools are chosen as pilots to implement the reform; in 2015, some cities and counties are selected to begin reforming and in 2016, the curriculum reform is popularized all over the province.

The main tasks of the reform are as follows:

Firstly, establishing multiple choice mechanism. After a semester of adaptive learning, students can have at least two choices when they choose majors, if they meet the needs, they are allowed to graduate earlier or later. Gradually promoting and implementing "credit system", "flexible system" and so on. Implementing mentor institution to help students' professional studies. Career guidance should be addressed to make students bring out their career potential.

Secondly, optimizing selective course system. Selective course system consists of "core curriculum module" and "optional curriculum module", the former one acted as compulsory course while the latter one as school-based curriculum. The teaching

²⁰Curriculum Reform of Secondary Vocational Education in Zhejiang Province. <http://www.zjedu.gov.cn/news/27092.html>).

time of the core curriculum module should be no more than 50% of the total time and the teaching time of the “optional course module” should be no less than 50% of the total time. Both of the “core curriculum module” and the “optional course module” should set up the training course. The construction of selective course system should be closely combined with the actual situation of our province to deepen the reform of college entrance examination system, such as autonomous enrollment in advance, independent recruitment, etc.

Thirdly, innovating teaching organization method. To further explore the reform and innovation of teaching organization under the guidance of the concept of “modern apprentice system”; to strengthen the practical teaching suitable for students’ learning characteristics; to actively guide and organize vocational school students to carry out autonomous learning and cooperative learning; to divide the academic year into a number of “alternative” term according to different teaching functions; to innovate teaching methods and multiply organize teaching process.

Fourthly, creating a diverse system of selective courses. Making full use of professional advantages of schools, technical strength of cooperative enterprises, teaching resources of ordinary high schools and higher education as well as resources of network courses to help students develop their professional virtues, theoretical knowledge and professional skills. Provincial education and scientific research departments should guide the development of digital network selective courses.

Lastly, establishing a new teaching evaluation system which is suitable for the selective course system. Developing curriculum standards for each elective course so as to set out the nature, teaching objectives, teaching content, teaching hours and the implementation of the course. Under the implementation of the “credit system” management, all courses have credits according to the number of hours. Setting up minimum credits required for graduation. Evaluating different courses in different quality evaluation methods, based on the course nature and teaching aim.

Chapter 4

Specialty Setup of Technical and Vocational Education



Early Chinese higher education and technical and vocational education were carried out without the division of specialties. The Hongdumen Academy, which coexisted with the Tai Xue (Imperial College) in East Han Dynasty and specialized in literature and arts, the four institutes (Confucianism Institute, Chinese Metaphysics Institute, Literature Institute and History Institute) in the Southern and Northern Dynasties and the academies focusing on laws, calligraphy, arithmetic and medicine in Sui and Tang Dynasties, which are similar to the subsequent special academies and various colleges of literature, laws, theology and medicine of the universities in West Europe in the Middle Ages, could be considered as examples of education based on different specialties, albeit in rudimentary form. In the course of time, the constant development of society, economy, culture, science and technology, and the increasingly detailed social division of labor required that more specialties be set up. Consequently, recent higher education and technical and vocational education have established different majors and with various specializations. Before 1949 there were no specialties in Chinese higher education and vocational education. At that time, although the classification of departments and branches had something in common with the subsequent classification of specialties, it catered to a much more extensive social demand. It was not until 1952 that majors were extensively set up in Chinese educational institutions.

The secondary technical schools, which were part of the secondary technical and vocational education system in the 20th century, resulted from the policy of learning from the Soviet Union. Therefore, in the 1950s, specialties were set up in such schools. Technical schools did not set up specialties but had courses, such as lathing, bench work, riveting, electrical work and welding, which are also called majors in recent years. Vocational high schools started in the late 1970s and set up specialties. At present, both higher education and technical secondary in China are carried out on the basis of different specialties. Thus, technical and vocational education also belongs to specialized education.

However, the specialties of technical and vocational education are different from those of higher education. The specialties of higher education are divided according

to the subjects, social development and working field, which emphasizes the technicality and tends to widen the scope of subject knowledge and develops towards a comprehensive education. The specialties of vocational schools are set up according to the division of professions and the demand of the expertise for special professions and positions. They emphasize the training of occupational and integrated abilities as well as the basic applicability for employment.

4.1 Several Conceptions About Specialty Setup of Chinese Vocational Schools

4.1.1 Specialty Setup

Specialty setup refers to the establishment and adjustment of specialties in institutions of higher education and vocational schools. Here “establishment” refers to the newly established and open specialties and “adjustment” refers to the alteration or cancellation of existing specialties. Technical and vocational education carries out the different specialized education. The specialty setup is a main sign to differentiate vocational schools from common schools and also an evident characteristic of the structural organization of vocational education. Provided the vocational school is to “produce”, through specialized education, the “products” that meet the social demand, the setup of specialties could be considered as the model of “products”.

The specialty setup belongs to the category of specialty construction in which the vocational schools are systematic project, which demonstrates, designs, operates and adjusts the specialties based on the social division of labor, classification of subjects, development of science and culture and the demand of qualities and abilities of special talents for the development of economy and society. Specialty setup is a “subsystem” of the specialty construction system, including the basic works of social survey, vocational analysis, feasibility analysis, and specialty argumentation and design.

4.1.1.1 Forms of Specialty Setup

According to the above-stated definition of specialty setup, the basic form of specialty setup is the establishment of new specialties and the adjustment or alternation of the original specialties. Other forms of specialty setup, such as the update of the content of specialized education, development of the functions of specialties and the structural integration of correlated specialties, could be contained in the two basic forms of specialty setup.

4.1.1.2 Connotation and Extension of Specialty Setup

The specialty setup of vocational schools is a systematic project, which includes the following basic issues. First, vocational schools are required to provide applied talents for the local economy and the development of society, and the pertinence of local talent demand must be emphasized. Universal survey is a must for the specialty setup of vocational schools, including not only the survey of demand of certain talents in the labor and human resource market but also the survey of professional demand of future employees. Secondly, vocational analysis is carried out to determine the working positions, responsibilities, tasks and employment scope a certain specialty covers and the requirements of the knowledge, abilities and attitude for the talents, which provide the direct basis for the feasibility analysis of specialty setup and subsequent development of courses. Thirdly, doing feasibility analysis. The so-called feasibility analysis refers to the research on the possibility of the conditions necessary for the implementation of specialized education, including professional faculty force, teaching and training facilities and sites, teaching materials, fund source, and so on. A specialty could not be established until the necessary conditions are fulfilled by the school itself. Fourthly, carrying out the specialty design. The specialty design mainly includes the criterion and regulation of specialty name, length of schooling, operation scope, the main teaching contents and the specialization or orientation of the specialties. Therefore, the connotation of the specialty setup of the vocational schools could be considered as the systematic operation of the development of new specialties and the adjustment of existed specialties based on the universal survey and vocational analysis according to the demand of markets and students.

The vocational schools carry out their development of “software” and “hardware” based on the scheme of specialty setup, including the design of the courses, compilation of the teaching plan and teaching program, development of teaching materials, organization of teaching staff, improvement of professional labs and training facilities and the determination of evaluation methods, through which the professional training program is completed. Seen from the extension of specialty setup, all these activities have a close relationship with the specialty setup. In other words, all these activities should be carried out, based on the specialty setup.

4.1.2 Specialty Catalog

4.1.2.1 Conception and Function of Specialty Catalog

Specialty catalog refers to the classification catalog of the institutes of higher education and vocational schools which train all kinds of talents. Commonly, the catalog prescribes the division of specialties and the names of specialties; they also reflect the training operation specification and employment orientation. The catalog functions as an important basis for the setup and adjustment of specialties, implementation talent training, guidance of graduates' employment and the fulfillment of educational

statistics and information processing and is taken as a basic guiding document for the administrative management and schooling of higher education and secondary vocational education.

The specialty catalog has the following functions: First, it provides the schools with a criterion for the specialty classification and quality specification of talent training; secondly, it provides the students with guidance on specialty selection and employment; thirdly, it provides the employing organizations and units a reference point for the selection, usage and management of various talents in the human resource market; fourthly, it provides a basis for the information communication between schools, schools and enterprises and between schools and the society.

4.1.2.2 Specialty Catalog of Higher Technical and Vocational Education

With the rapid development of education, the specialty setup and adjustment of higher technical and vocational schools face some new problems, especially the random specialty setup. Some schools use the specialty names of the undergraduate education and some follow the specialty names of the secondary vocational education. Therefore, some educational specialties in different higher technical and vocational schools have quite different names. According to the preliminary statistics from the admission departments, there are at least 1500 specialty names in higher technical and vocational schools. The nonstandard specialty names, to some degree, have affected the adjustment of the specialty structure in higher technical and vocational schools, the classification, statistics and macro-control of talents.

In 2015, the Ministry of Education printed and distributed the Guiding Specialties Catalog of General Colleges, Higher Technical and Vocational Institutes (hereinafter referred to as “Catalog”) and Administrative Measures of Guiding Specialties Catalog of General Colleges, Higher Technical and Vocational Institutes and explicitly proposed that they would come into force in 2016. It was the second time in the management of specialty setup on the level of technical and vocational education and filled the lack of specialties catalog of higher technical and vocational institutes in China. Table 4.1 introduces specialty names of computers.

It is a guiding catalog, but not a “prescriptive” or “rigid” one. First, the reason why the Ministry of Education establishes this Catalog is to regulate the specialty names so as to provide a frame of reference for the establishment and adjustment of specialties, to improve the teachers and students’ understanding of the connotation of specialties in higher technical and vocational institutes and provide the students with a reference for further education. Secondly, the Catalog will be properly adjusted and updated every two years according to the characteristics of higher technical and vocational institutes and social demands for the talents to ensure the interactive and synchronized development between higher technical and vocational education and the social demands of skilled talents.

The Catalog has 19 main categories of specialties, 99 secondary categories and 748 specialties, which represent the service-centered and employment-oriented guiding principles, reflect the features of higher technical and vocational education and

Table 4.1 Guiding higher technical and vocational institutes (computers)

Specialty code	Specialty name	Core abilities of the specialty
610201	Technology of Computer Application	Designing and programming ability of hardware interface, designing and developing ability of computer software, installation and collocation ability of computer hardware
610202	Computer Network Technology	Installation and maintenance ability of computer network, programming ability of network application software
610203	Computer Information Management	Information processing and managing ability, developing and maintaining ability of information management system software
610204	Computer System Maintenance	Computer hardware testing and maintaining ability, programming and debugging ability of computer application software
610205	Software Technology	Developing and programming ability of computer
610206	Software and Information Service	Software outsourcing service and information service
610207	Animation and Cartoon Editing Technology	Design and editing of animation, advertisement graphic design, designing and producing ability of interactive multimedia works

stimulate higher technical and vocational education to serve social and economic development and people's all-round development. It has the following four aspects:

First, the principle of combining vocational with academic education. The Catalog has classified the specialties of the higher technical and vocational institutes based on the classification of industries, domains or vocational positions (groups) as well as the quality of the subjects. For example, the second main category of the Catalog, traffic and transportation, is involved in the Ministry of Transportation, Ministry of Railways and Civil Aviation Administration, which are classified into one main category because they are all part of the traffic and transportation industry.

Secondly, the principle of combining stability with flexibility. The specialties of the Catalog are classified into three levels, i.e. main specialty category, specialty category and specialty. The main specialty category and specialty category are relatively stable and the specialty is flexible. Schools and all local educational administration departments can take it as a reference when they set up specialties and fulfill the verification and archiving procedures. Schools may add other specialties that are not contained in the Catalog under the related specialty category, or mark the specialty orientation or connotative feature of the specialty in the form of “()” according to the specialty names in the Catalog.

Thirdly, the principle of combining universality with diversity. Provinces and cities may adopt supplementary catalog with local features in addition to the Catalog. At the same time, for the specialties with the same names in the Catalog, different institutes in different areas may have different connotations and extensions, and carry out characteristic courses and training activities with different emphases and features.

Fourthly, the principle of combining applicability with pertinence. Applicability and pertinence, i.e. a “wide” conception and a “narrow” conception, may coexist to an appropriate degree. For example, there is a “wide” specialty named “Application English”, and also the specialties of “Business English” and “Tourism English” with a stronger relevance.

4.1.2.3 Specialty Catalog of Secondary Vocational Schools

The specialty catalog of Chinese secondary vocational schools was first brought into being in the period of learning from the Soviet Union in the 1950s. The specialty setup of the vocational schools needs to be regulated and guided by the specialty catalog. Furthermore, with the development of society, adjustment of industrial structure and changes of vocations, the specialty catalog has to be constantly adjusted and amended.

Due to historical reasons, there are three basic types of secondary vocational schools in China, namely secondary technical school, vestibule school and vocational high school. The specialty catalogs of the three types of secondary vocational schools were separately issued. In 1963, the Ministry of Education issued the Specialty Catalog of Secondary Technical Schools, which included 348 specialties. In 1993, the Ministry of Education issued the Specialty Catalog of General Secondary Technical Schools, which included 518 specialties. In 1995, the Ministry of Labor issued the Specialty (types of work) Catalog of Technical Schools, which included more than 500 specialties (types of work). In 1998, the Ministry of Education summed up the Specialty Catalog of Vocational High Schools, which contained more than 900 specialties.

The three types of secondary vocational schools all belong to the secondary vocational educational level and have some common training objectives, which is not practicable to the extent of schooling system. Therefore, in 2000, the Ministry of Education issued the Suggestions on the Adjustment of Overall Arrangement and Structure of Secondary Vocational Schools. The Suggestions points out that the overall arrangement of the secondary vocational schools should be adjusted, the educational resources should be optimized and the three types of schools, namely secondary technical school, vestibule school and vocational high school should be combined into one “secondary vocational school” with unified guidelines and training objectives.

A unified specialty catalog is needed to meet such a requirement. The original specialty catalogs are independent and intercrossed. The specialties are much too specific and narrow to meet the demands of the adjustment of industrial structure and advancement of science and technology. Therefore, in September 2010, the

Ministry of Education issued a unified Specialty Catalog of Secondary Vocational Schools, which is in accordance with the educational level of the secondary vocational schools and applicable to the classification of the industries and vocations in China. It is both realistic and prospective and is constituted with the exact, scientific and standard specialty names. During the construction of the catalog, the Ministry of Education cooperated with all ministries (departments) of the State Council, local educational administration departments and the technical and vocational education advisory committees of 33 industries and carried out a comprehensive survey and analysis of the conditions and trend of the demand for talents in various industries. It summed up the experiences of specialty setup in all types of secondary vocational schools in all areas and took the existing specialty catalog of the secondary vocational schools as a reference. The catalog sets up 19 main categories and 321 specialties with specialized examples. The personnel trained under the catalog are qualified for over a thousand positions of the second, third, fourth, fifth, and sixth main category of the Grand Dictionary of Occupation Classification of the People's Republic of China. The new catalog is in accordance with the requirements of the adjustment of Chinese economic and industrial structure in the beginning of the 21st century and emphasizes the training of students' comprehensive vocational abilities. It is a basic guiding document to carry out all types of secondary vocational education.

The Specialty Catalog of Secondary Vocational Schools is a basic guiding document to carry out the management and schooling of secondary vocational education. It is applicable to all types of secondary vocational schools that carry out the education at high school level. After the Specialty Catalog of Secondary Vocational Schools has been issued, all the secondary vocational schools must recruit students according to the specialties that are listed in the Specialty Catalog of Secondary Vocational Schools.

4.2 Fundamental Basis of Specialty Setup of Chinese Technical and Vocational Education

4.2.1 Training Objectives of Technical and Vocational Education

In the late 1980s and early 1990s, China took vigorous action to develop vocational education. In the late 1990s, the Ministry of Education was required to combine higher technical education and vocational education into a unified form of higher technical and vocational education. At the early stage of higher technical and vocational education development, there were no unified and standard specialty catalogs, instead, the reform of higher technical and vocational education that got rid of the traditional undergraduate teaching model was emphasized and the schools were given the right to determine the specialty setup. The schools made efforts to make their specialties to meet the demands of the market through enterprise survey, market

analysis and establishment of specialty committees. Such measures had the desired results and up to the late 1990s, the specialty setup of the schools was in accordance with the demand of the market and society.

In order to develop technical and vocational education and make an appropriate orientation for vocational education, the training objective must first be determined. The training objectives of Chinese technical and vocational education may be interpreted in different ways in different periods. Generally speaking, the basic training objective is consistent, but its connotation becomes increasingly abundant and specific. At the end of 2003, the National Work Conference on Person of Talent held by the Central Committee of the Party brought forward the conception of “highly-skilled” talents, brought the training of skilled persons, especially highly-skilled person, into the working scope of the party and took the training of skilled persons as an important component of the strategy of reinvigorating China through human resource development. The 2003–2007 Plan of Education Invigorating Activities issued by the Ministry of Education emphasized “making great efforts to train skilled talents, especially highly-skilled talents of high qualities.” The minister, Zhou Ji, brought forward the specific training objective of the secondary vocational schools and higher vocational institutes in the National Vocational Education Work Conference in June, 2004. Zhou pointed out that “the mission of secondary vocational schools is to train hundreds of millions of laborers of high qualities and the mission of higher vocational schools is to train tens of millions of highly-skilled talents.” “It must be specified that the higher vocational schools are to train white-collars and senior blue-collars, or so-called ‘silver-collars’. They are highly-skilled talents.” The Suggestions on Overall Advancement of Education for All-round Development and Deepening of the Reform of Secondary Technical and Vocational Education issued by the Ministry of Education required the secondary vocational schools to fully implement the educational guidelines of the CPC, change the educational ideology, build up the conception of ability-oriented education based on all-round development and train the laborers of high qualities and secondary and elementary specialized talents who can meet the requirements for socialist modernization construction, make all-round development of morality, intelligence, physique and art, have the comprehensive vocational abilities and work on the front line of production, service, technology and management.

The training objective of higher technical and vocational education is to train the talents, who can meet the actual requirements for Chinese modernization construction, make all-round development of morality, intelligence, physique and have strong practical working abilities. The specialty setup of Chinese higher technical and vocational education fully embodies the training objective of our higher vocational education. The newly-constituted “Guiding Specialties Catalog of General Colleges, Higher Technical and Vocational Institutes (trial)” have set up 19 main categories, i.e. agriculture/forestry/animal husbandry/fishery, traffic and transportation, biology/chemistry/pharmacy, resource development and plotting, materials and energy sources, civil engineering, water conservancy, manufacturing, electronic information, environmental protection/meteorology/security, light textile and food, finance and economics, healthcare and medicine, tourism, public utilities, culture and educa-

tion, art/design/media, public security and law, according to the general classification of branches and categories. The specialty classification is compatible with the vocational position groups, focuses on the industries and also attaches attention to the classification of subjects, which represents the vocational features of higher vocational education. Taking Sichuan Province as an example, the specialties are classified into 15 categories, namely agriculture/forestry/animal husbandry/fishery, traffic and transportation, chemical engineering, geology and mineral resources, materials, civil engineering and real estate, machinery, electric power, electronic information, light industry, healthcare and medicine, finance/economics/trade, tourism and service, education/culture/art and teacher training. Each category is divided into several specific specialties according to the difference of technical positions and actual working abilities, technologies and skills. For example, in the category of healthcare and medicine, there are 10 specific specialties, namely preventive medicine, clinical medicine, traditional Chinese medicine, Tibetan medicine, stomatology and oral cavity technology, medical laboratory technology, medical inspection, family planning medicine, medicine cosmetology and recovery and health. Such specialty setup fully embodies the training objectives of Chinese higher vocational education, i.e. to train the talents with strong actual working abilities and skills on the front line of manufacturing, management, construction, operation and service.

4.2.2 Demands of Society for Occupations (Professional Post Group)

Chinese technical and vocational education has been adopting the model of “occupation–specialty–courses” for a long time. That is to say, when there are demands for certain occupations in the society, a corresponding specialty is set up and the course is designed. The internal relation is: The specification of the demand for the talents is the most appropriate measurement to determine the occupations and to make further differentiation; the classification of vocational activities is the jumping-off point for determining the specialty setup; the necessary knowledge, qualities and abilities, which are determined based on the specific tasks, changing conditions and developmental–prospects of the occupations, are taken as the basis to determine the courses.

Nowadays, the Chinese economic system is undergoing a transformation from a planned economy to a market economy, which leads to a great change of demand for different talents. The rapid development of modern science and technology and China’s entry into the WTO has led to a reform of domestic economic structure, industrial structure and organizational forms of labor. Therefore, some traditional occupations have disappeared and some new ones are constantly coming forth. After China has entered into the WTO, there was a great shortage of talents in the infant industries, such as information, economics, international trade and market laws. However, the existing technical and vocational education is not able to train enough

such talents. Besides, with the introduction of a great deal of new technologies, a large number of senior technical talents are needed to maintain and operate the various equipment introduced into China. Current specialty construction of Chinese vocational education, however, cannot meet the social demand in the job market. The specialties should be adjusted according to the constant change of market demand. There is no doubt that specialty construction lags behind the demand in the labor market. Therefore, we should establish new specialties, rebuild and adjust traditional specialties and enhance the specialties' applicability to the labor market.

In China, the aim of technical and vocational education is to serve the modernization construction, which mainly represents itself in training a great deal of employed persons of high qualities for the various industries in the society. Therefore, the adjustment of specialties in the vocational institutes must start from the actual demand of the labor market. Based on the change of demand of occupations in various industries and the demand of urban and rural economic development and adjustment of industrial structure, the schools should aim at related industries and occupations and set up the regular specialties that have promising employment prospects and great social demand. Any specialty adjustment that deviates from the demand of the labor market and students' employment demand will be denied by the labor market. Therefore, the specialty adjustment of technical and vocational education must take the demand of labor market as its orientation and stick to the general principle to serve the economic and social development so as to train and provide senior trained talents for various industries and various economic and social departments.

For example, with Shenzhen Polytechnic, the school takes the industrial structure and changing trend of the demand of social talents as its basis to adjust the main frame of the specialty system. In view of that, electronic information, higher manufacturing, modern logistics and modern service industry will become the dominant and backbone industries for Shenzhen's future economic development, which will lead to a great demand for talents in related industries. Shenzhen Polytechnic attaches great importance to the development of the specialties related to logistics, electronic information, industrial manufacturing and service industries and determines to make them as their key specialties. Furthermore, because the garments, furniture, pearls and jewelries, prints and packages, hotels and tourism of Shenzhen are preponderant in China, the school has set up and adjusted the specialties of garment design and techniques, furniture design, jewelry design, videotext information engineering, modern packaging engineering, hotel management and tourism management. At the same time, Shenzhen Polytechnic takes the demand of the human resource market as its orientation and set up the short-term specialties in urgent social needs. It has frequently and rapidly trained a small number of talents in special industries to meet the urgent need of society. Shenzhen Polytechnics also takes vocational posts (groups) as the basis to set up specialties aiming at a certain post (such as advertisement designer) or a group of related vocational posts. For example, in order to solve the shortage of marketplace managers, who are capable of both software management and hardware management, in the large and medium marketplaces in Shenzhen, the school has set up the specialty of marketplace management but not the business management specialty as other general colleges do. The tiny difference of the two specialty

names reflects the difference of training objective and specialty setup between higher technical and vocational education and general higher education.

4.2.3 Adjustment of Industrial Structure and Advancement of Science and Technology

With the deepening reform of the Chinese economic system, collective, individual, private and foreign enterprises represent an increasingly bigger proportion in China's economy. Such change of economic ownership and investment structure, therefore, leads to an urgent demand for talents who are good at foreign languages, technologies and operation. This has brought a new challenge to the vocational education, which formerly emphasized the training of talents for the organizations and enterprises owned by the whole people and now should pay more attention to the training of talents for collective, individual, private and foreign enterprises. At the same time, with the expediting adjustment of industrial structure, there is an increasingly urgent need of high-level talents. The vocational schools should actively and timely adjust the specialties and set up the applicable specialties mainly for local backbone industries, high and new technical industries and service industries to ensure the close connection between specialty training and the demand of industrial structure.

Technical and vocational education is also an important base for the training of various talents for the tertiary industry. With the economic and social development and the increasing expansion of the market economy and opening-up policy, especially after China's entry into the WTO, the tertiary industry needs more talents of higher qualities. We should not only train the talents specialized in the theory of the tertiary industry, but also need to train the managers, economic engineers and lawyers for the tertiary industry. The vocational institutes must adopt themselves to the demand of talents with the economic and social development and timely adjust the specialty structure through adding the specialties of electronic commerce, logistics, environment service, property management, tourism, community service, commerce, information, township enterprises management and courtyard economy and holding various medium and short-term training classes, thus to train a number of professional talents for the tertiary industry of different levels and different types.

With the rapid development of science and technology and sustained growth of the economy, the social division of labor becomes more and more specific. The specialization constantly increases, connections between different industries become increasingly close, interdisciplinary subjects, compound specialties and new types multi-industrial occupations constantly come forth. It is necessary to set up new specialties and reform the traditional ones. While adjusting the specialty setup, the vocational schools should combine the external requirements of the frontline work and the internal connections between subjects and set up the compound specialties. As a matter of fact, with the constantly strengthening integration trend in modern production, scientific researches and technologies, the knowledge and skill connota-

tion of the technical posts constantly enrich themselves. It becomes a common trend to train compound talents in the development of higher education among all the countries in the world. Therefore, technical and vocational education should develop itself for the training of compound talents. In recent adjustments of the specialty setup in China, the method adopted is that of intercrossing and compounding subjects and specialties. The specific methods include the following three: Compound different specialties, for example, Business English, Business Japanese, Property Electro-mechanics and Integrated Wiring, Foreign Trade and International Settlement, Shipping and Port Management, and the like. Compound professional knowledge with specialized skills, for example, Garment Design and Techniques, Hotel and Restaurant Management and Manufacturing, Computer-aided Design and Manufacturing, etc. Dividing after compounding, i.e., compounding similar specialties of complex technical elements, and then gradually dividing it into the specialties with different orientations based on the market demand and the schools operating conditions. Finally when it is possible, set up different specialties based on the specialty of different orientations.

4.2.4 Establishment of Characteristic and Competitive Specialties

Characteristic specialties and famous specialties are important factors for the core competitiveness of vocational institutes. In order to guide the vocational institutes to make the adjustment of specialties based on their own conditions and to encourage the vocational institutes to establish characteristic and competitive specialties, the Ministry of Education has recently publicized a list of competitive specialty construction projects of Chinese technical and vocational schools. Some of these are the Mechanical and Electrical Technical Application Specialty of Beijing Polytechnic College, Communication Technology Specialty of Beijing Union University, Sculpturing Specialty of Hebei Technical and Vocational Institute, Ferrous Metallurgy Specialty of Shanxi Engineering Vocational College, Textile Specialty of Nantong Textile Vocational Technology College, Footwear Manufacturing and Techniques Specialty of Zhejiang Industry & Trade Polytechnic, Ocean Vessel Sailing Specialty of Qingdao Ocean Shipping Mariners College, Tea Specialty of Xinyang Agricultural College, Water Conservancy and Hydropower Engineering Specialty of Yellow River Conservancy Technical Institute and Airplane Electrical Equipment Maintenance Specialty of Guangzhou Civil Aviation College. The above-mentioned specialties are the traditional competitive and characteristic specialties in the school and are an example of the core competitiveness of the institutes.

Liaoning Province has taken a line in accordance with its own characteristics. In order to adapt and serve the actual demand of the society, Liaoning Department of Education has made a great adjustment of the specialty setup in the higher vocational institutes beginning in September 2003. The adjustment mainly requires all the

institutes not to determine the specialty setup only based on their own operational conditions and not to train the senior technical talents in the model of academic schooling. The specialties, which have small social demand, inexplicit orientation and low employment rate, should be firmly adjusted. The newly-established specialties from now on should be the specialties in urgent need related to the rejuvenation of the old industrial bases in Liaoning, especially the specialties related to the equipment manufacturing bases, important raw material processing bases and the dominant industries of Liaoning Province. Efforts should be focused on the establishment of a batch of model and brand specialties so as to stimulate the reform and renovation of talents training mode in all the schools in the Province. For example, the Higher Vocational Institute of Dalian University has removed eight specialties, including Education of Politics and Law, Art Design, Chinese Language and Literature, and so on, and only retained six specialties that are in accordance with the demand of the economic development of Dalian, including Hotel Management, Higher Nursing and so on. Yingkou Technical and Vocational Institute has reduced their specialties from 32 to 22 by removing Portfolio Investment, Business Administration and Secretary, along with others.

4.3 Characteristics of Specialty Setup of Technical and Vocational Education

4.3.1 Expansion of Specialty Scale

Since the right to examine and approve technical and vocational institutes was transferred to the government of provinces, municipalities and autonomous regions in 2000, higher technical and vocational education in China has undergone a rapid development and expansion. According to the statistics, there are as many as 700 independently established technical and vocational institutes (including vocational colleges) in 2003, basically at least one technical and vocational institute in every city¹ (Liu 2004). According to the statistics of Hebei Province (see Table 4.2), in the three years from 2001 to 2003, the number of the dependent technical and vocational institutes has increased by 91.3% from 23 to 44, and the number of recruited students has increased by 124.4% from 21,300 to 47,900. The higher technical and vocational education in Hunan also underwent a very rapid development. Up to the first half of 2003, there were 50 independent technical and vocational institutes, which represents 59% of all the general colleges and 187,000 students in higher technical and vocational institutes, which accounts for 44.5% of all the college students.² With the rapid development of school scale, the scale of the specialty setup

¹Liu Lanming (2004). The Research of Present Situation & Solution of Specialty Setting in Middle Vocational Schools in Xuzhou. Master's Paper from Tianjin University: 137.

²Ouyang He, Huang Longwei, Wang Jiangqing (2003). Research and Reflections on Higher Professional Education Development in Hunan. <http://www.edu.cn>.

Table 4.2 Statistics of the basic conditions of the higher vocational institutes in Hebei Province from 2001 to 2003

Year	Index						
	Number of schools	Recruited students		Graduates (ten thousand)	Current enrollment		Professional teachers
		Total number (ten thousand)	Percentage taken in total recruited college students (%)		Total number (ten thousand)	Percentage taken in total recruited college students (%)	
2001	23	2.13	14.39	0.36	4.48	12.77	3889
2002	32	3.25	19.01	0.9	6.91	14.61	5783
2003	44	4.79	23.48	1.64	10.16	17.66	8489

Data Source “2000–2003 Educational Statistics Summary” of Hebei Department of Education

also experiences a constant expansion, which is mainly embodied in the increase of specialty number and the widening of specialty coverage. Seen from the specialties of 166 member schools of Higher Vocational Education Research Institute, there are totally 3068 specialties and 1504 still exist after combination of the repeat specialties³ (Feng 2001). The specialties basically cover 19 main categories, including agriculture/forestry/animal husbandry/fishery, traffic and transportation, biology/chemistry/pharmacy, resource development and plotting, materials and energy sources, civil engineering, water conservancy, manufacturing, electronic information, environmental protection/meteorology/security, light textile and food, finance and economics, healthcare and medicine, tourism, public utilities, culture and education, art/design/media, public security and law.

4.3.2 Adjustment of Specialty Structure

With the advancement of the production level and application of a great deal of science and technology in production, Chinese industrial structure has not only transferred from the first industry to the second industry, but also from the first and the second industry to the third industry, and more frequently transferred between the second and third industries (see Table 4.3).

The developmental trend of industrial structure determines the flowing direction of human resource: The first industry → the second industry → the third industry; from production departments to non-production departments; from industry to service, and

³Feng Heping (2001). Research of Higher Professional Schools' Setting and Management Problems. *Education & Profession* (12):16–19.

Table 4.3 Percentage of the employed persons of the three Industries in China from 1997 to 2002

Year	Index						
	Total number of employed persons (ten thousand)	Number of the employed persons in each industry (ten thousand) and its percentage taken in the total number of employed persons (%)					
		First industry		Second industry		Third industry	
	Employed persons	Percentage	Employed persons	Percentage	Employed persons	Percentage	
1997	69820	34840	49.49	16547	23.7	18423	26.4
1998	70637	35177	49.8	16600	23.5	18860	26.7
1999	71394	35768	50.1	16421	23.0	19205	26.9
2000	72085	36043	50.0	16219	22.5	19823	27.5
2001	73025	36513	50.0	16284	22.3	20228	27.7
2002	73740	36870	50.0	15780	21.4	21090	28.6

Data Source China Statistical Yearbook 2003, China Statistics Press, Beijing, 2004

from labor intensive industries to knowledge intensive industries. The development of information science, life science and new material science has accelerated the reorganization, reform, optimization and updating of traditional industries and the flowing of human resource. The great transfer of social labor between industries has a huge influence on the structure of Chinese labors. The higher and secondary vocational institutes are most sensitive to such changes, which are specially embodied in the change of specialty structure. Taking Beijing Vocational High Schools for example, from 1994 to 1999, there were 751 specialties established, among which 192 are of the second industry, accounting for 25.6% and 545 are of the third industry, accounting for 72.5%. The specialties of the third industry are 2.6 times as many as those of the first and second industry⁴ (Jiang 2001). Under the situation that the number of students in regular high school is on the rise and that of vocational schools is constantly decreasing, the vocational schools have aimed at the employment market and adjusted and the specialty setup in time to adapt themselves to the influence of economic development of the labor structure and the constant change of the talent demand structure. Taking Hebei higher institutes for example (see Table 4.4): In 2003, there were 835 specialties and more than 100,000 students, among which there are 34 specialties and 2178 students of the first industry, which accounts for 2.14%, 179 specialties and 19,753 students of the second industry, which accounts for 19.43% and 622 specialties and 79,731 students of the third industry, which accounts for 78.43%. The number of the specialties of the third industry is three times and the number of students is 3.6 times as many as those of the first and second

⁴Jiang Liping (2001). The Present Situation & Trend of Middle Vocational School's Specialty Setting. *Education Science Research* (6):18–21.

Table 4.4 Recruited students in the higher technical and vocational institutes in Hebei (classified based on the three industries)

Specialty category	Number of specialties	Recruited students (ten thousand)				
		2001	2002	2003	Total	Percentage (%)
The first industry	34	414	830	934	2178	2.14
The second industry	179	4353	5863	9537	19753	19.43
The third industry	622	16574	25776	37381	79731	78.43
Total	835	21341	32469	47852	101662	100.00

Data source China Statistic Year Book 2003: Beijing: China Statistics Press. 2004

industry. Through the analysis of the Guiding Specialty Catalog of China Higher Technical and Vocational Education (the fourth version), there are 63 specialties of the first industry, including agriculture, forestry, animal husbandry, fishery and mining industry, taking a proportion of 11%; there are 201 specialties of the second industry, including manufacturing and processing industry, taking a proportion of 36%; there are 292 specialties of the third industry, taking a proportion of 53%⁵ (Xie 2004). Such situations are in accordance with the flowing trend of the employed persons in China.

In order to train the highly-skilled talents, who are in urgent social demand, a number of specialties are established, centralizing in the high and new technology industries and some hot specialties. At the same time, some specialties that are not in accordance with the social and economic development are gradually eliminated. Seen from Hebei Province (see Table 4.5), the main centralized specialty categories are: Electronic information, 148 specialties, 23.99% of the total number of the students; finance and economics, 174 specialties, 20.29% of the total number of the students; manufacturing, 96 specialties, 9.60% of the total number of the students.

4.3.3 Flexibility of Specialty Setup

In the early 1980s, the specialties of Chinese higher technical and vocational institutes were set and adjusted mainly on the basis of the specialty setup principles of general academies and colleges, which could not realize the talent training objective of higher vocational education. Through persistent efforts in recent years, the specialty setup and adjustment of higher and secondary vocational institutes have succeeded

⁵Xie Yongqi (2004). Research of Higher Professional Schools' Specialties Setting. Doctor's Paper from Tianjin University: 40.

Table 4.5 Specialty categories and students of higher vocational institutes in Hebei in 2003

Specialty category	Number of specialties		Number of students					Percentage (%)
	Number	Percentage (%)	Total	Grade 1	Grade 2	Grade 3	Percentage (%)	
Agriculture/Forestry/Animal Husbandry/Fishery	33	3.95	1923	764	745	414	1.89	
Traffic and Transportation	18	2.16	1998	1016	695	287	1.97	
Biology/Chemic/Pharmacy	27	3.23	2149	1312	722	115	2.11	
Resource Development and Plotting	4	0.48	440	237	106	97	0.43	
Materials and Energy Sources	10	1.20	1080	627	329	124	1.06	
Civil Engineering	34	4.07	4839	2126	1521	1192	4.76	
Water Conservancy	1	0.12	255	170	85		0.25	
Manufacturing	96	11.50	9764	4777	2629	2358	9.60	
Electronic Information	148	17.72	24388	11110	8430	4848	23.99	
Environmental Protection/Meteorology/Security	24	2.87	2108	1004	564	540	2.07	
Light Textile and Food	8	0.96	1481	458	556	467	1.46	
Finance and Economics	174	20.84	20626	9842	6884	3900	20.29	
Healthcare and Medicine	20	2.40	2429	1424	696	309	2.39	
Tourism	27	3.23	2790	1521	887	382	2.74	
Public Utilities	38	4.55	2879	1642	771	466	2.83	

(continued)

Table 4.5 (continued)

Specialty category	Number of specialties		Number of students				Percentage (%)
	Number	Percentage (%)	Total	Grade 1	Grade 2	Grade 3	
Culture and Education	69	8.26	8507	4079	2838	1590	8.37
Art/Design/Media	77	9.22	4391	2006	1352	1033	4.32
Public Security	2	0.24	1317	560	401	356	1.30
Law	25	2.99	8298	3177	2258	2863	8.16
Total	835	100	101662	47853	32471	19112	100.00

Data source 2002–2003 Education Statistics Summary of Hebei Department of Education

in getting rid of the mode of general academies and colleges and have developed a specialty setup based on the demands of vocational posts (groups) or technical fields, which realize the relevance and applicability of higher vocational schooling. The specialty setup “actively adapts itself and gets adjusted, based on the demands with great flexibility.” The names of the specialties represent technicality and professionalism. For example, the Glasses Technology Specialty of Tianjin Vocational Institute, the Tourism Service and Management Specialty of Jinling Polytechnic College and the Flower and Garden Specialty of Shenzhen Polytechnic College have professional pertinence and evident vocational characteristics⁶ (Xie 2004). The specialties with broad extension, like Computer Application and Mechanical & Electrical Integration, attach more importance to its applicability and technicality.

4.3.4 Update of Specialty Name

At present, technical and vocational education in China has a close relationship with the market economy. The specialty setup, therefore, has to be constantly adjusted and updated following the changes in the market so as to be in accordance with the demands caused by the adjustment and updating of the industries. Taking the specialty of “dressmaking” for example, the “dressmaking” specialty is adjusted into “garment shopping guidance” and “garment model” according to the changes in garment market demand. Before 1980s, the color and pattern of Chinese garments were simplex and the garment industry developed slowly. With the advancement of the material standard of living, people have higher requirements for garments, which led to the rapid development of the industry. Aiming at the market in time, higher and secondary vocational institutes have set up a great deal of “dressmaking” and “garment technique” specialties to meet the market demand. After the 1990s, especially after entering into the 21st century, the rapid development of the commerce and service industry has provided a new field for the clothing industry, which leads to the emergence of specialties like “garment shopping guidance” and “garment model”. The newly established specialties have undergone a rapid development and have been recognized by the society. Another example is that the “fine arts” specialty is adjusted into “advertisement” specialty with the development of economy and society. “Computer” specialty and “fine art” specialty have been combined into a new “film and television animation” specialty. Besides, there are other transformations of specialties from machinery to electro-mechanics, from electronics to electronic computer and from preschool education to arts. In the past 20 years, the specialties of almost every higher vocational institute have been updated to a certain degree, including the update of the specialty names and contents. Besides, the update speed becomes increasingly fast.

⁶Xie Yongqi (2004). Research of Higher Professional Schools’ Specialties Setting. Doctor’s Paper from Tianjin University: 40.

4.3.5 Wide Connotation of Specialty

In the 1980s and the early 1990s, due to the policy of state job assignment and the job recommendation guarantee of the schools, the labor divisions of industries and department were very specific. Therefore, the specialty setup of the vocational schools only aimed at a certain post of a certain industry. The specialties had a narrow extension and were divided specifically. It played an active role to strengthen the schooling pertinence and improve the service to the industry under the system of planned economy. However, with the reform of economic system, problems caused by it became more and more serious. The labor and employment policies had been changed into “best student recommendation and dual-directional selection without assignment guarantees.” The higher and secondary vocational institutes should adjust and widen the connotation of the specialties in time and actively carry out the reform of schooling and course so as to conform to the trend of the times. With respect to the training objective, the training of compounded, applicable and practical talents should be attached with great importance. The schools should emphasize the fundamental courses, widen professional knowledge, apply modern educational methods and simulation teaching and build simulation environment so as to stimulate the overall development of students’ comprehensive abilities and make them in accordance with the social demand.

4.3.6 Normative Management of Specialty Setup

With respect to the management, the state has realized the difference between higher technical and vocational education and general higher education. It should have its own specialty catalog and the macro-management and control should be strengthened. Therefore, the Ministry of Education began to constitute the Guiding Specialty Catalog of China Higher Technical and Vocational Education (the fourth version), which has already been completed. The catalog should be further improved after universally collecting all of the suggestions. Most of the provinces and cities have constituted the guiding specialty catalog of higher vocational education based on their own economic development and demand for talents and have issued related management measures of specialty setup of higher vocational institutes. The provinces and cities have made the first move to manage the specialty setup ahead of the state.

4.4 Current Situation of Specialty Setup of Technical and Vocational Education

4.4.1 Current Situation of Specialty Setup of Higher Technical and Vocational Education

In 2015, the Ministry of Education distributed Specialty Catalog of General Colleges and Higher Vocational Education. The revised edition was based on the Guiding Specialty Catalog of General Colleges and Higher Technical and Vocational Institutes (trial) issued in 2004. Compared with the former catalog, some adjustments were made. These adjustments aimed at driving the docking of specialty setup and industry needs, curriculum content and professional standard, teaching process and production process, graduation certificate and vocational qualification certificate, vocational education and lifelong learning and promote the higher vocational education to better serve economic and social development and all-round development of human. The catalog classified specialties on the principles of giving priority to vocational posts (groups) or industries and attention to the classification of subjects. Since 2005, the students recruiting and statistics of higher vocational institutes began to use the Catalog. According to the Catalog, the higher technical and vocational education has set up 19 main categories, 99 secondary categories, and 748 specialties in all, which are listed in Table 4.6.

4.4.2 Current Situation of Specialty Setup of Secondary Vocational Education

The specialties of Chinese secondary vocational schools have been classified into 18 main categories, including agriculture, forestry, husbandry and fishery, resources and environment, energy and new energy, civil engineering and water conservancy, processing and manufacturing, petrochemical, textile and food, traffic and transportation, information technology, healthcare and medicine, leisure and health care, commerce and trade, tourism service, culture and arts, sports and fitness, education, judicial service, public administration and service and others, totally 321 specialties. The personnel trained under the catalog are qualified for over a thousand positions of the second, third, fourth, fifth and sixth main category of the Grand Dictionary of Occupation Classification of People's Republic of China. The specialty names, training objectives, suggested school period, operation scale and specialized teaching as well as the specialization examples of all the specialties are listed in Table 4.7.

Table 4.6 19 main categories and 99 secondary categories

Specialty code	Specialty name	Specialty code	Specialty name
51	Main Category of Agriculture/Forestry/Animal Husbandry/Fishery	6003	Category of Water Transport (Continue)
5101	Category of Agricultural Technology	600301	Navigation Technology
510101	Crop Production Technology	600302	International Cruise Crew Management
510102	Seed Production and Operation	600303	Ship Electronic and Electrical Technology
510103	Facility Agriculture and Equipment	600304	Ship Inspection
510104	Modern Agriculture Technology	600305	Port Machinery and Automation
510105	Leisure Agriculture	600306	Port of Electrical Technology
510106	Ecological Agriculture Technology	600307	Port and Waterway Engineering Technology
510107	Gardening Technology	600308	Port and Shipping Management
510108	Plant Protection and Quarantine Technology	600309	Port Logistics Management
510109	Tea Planting and Tea Processing	600310	Marine Engineering Technology
510110	Cultivation Technology of Chinese Herbal Medicine	600311	Maritime Salvage Technology
510111	Tobacco Cultivation and Processing	600312	Waterway Transport and Maritime Management
510112	Cotton Processing and Management	600313	Container Transport Management
510113	Agricultural Product Processing and Quality Inspection	6004	Category of Air Transport
510114	Green Food Production and Testing	600401	Civil Aviation
510115	Agricultural Marketing and Services	600402	Aviation Communication Technology
510116	Agricultural Products Circulation and Management	600403	Aeroplane Driving Skills

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
510117	Agricultural Equipment Application Technology	600404	Helicopter Driving
510118	Agricultural Economics and Management	600405	Air crew
510119	Rural Management and Administration	600406	Civil Aviation Safety Management
5102	Category of Forestry	600407	Civil Air Security
510201	Forestry Technology	600408	Airport Operations
510202	Garden Technology	600409	Aircraft Electrical and Mechanical Equipment Maintenance
510203	Forest Resources Protection	600410	Aircraft Electronic Equipment Repair
510204	Cultivation and Utilization of Economic Forest	600411	Aircraft Component Repair
510205	Protection and Utilization of Wild Plant Resources	600412	Aviation Ground Equipment Maintenance
510206	Protection and Utilization of Wildlife Resources	600413	Technology and Management of Airport Services
510207	Forest Ecotourism	600414	Aviation fuel
510208	Forest Fire Prevention Command and Communication	600415	Air Logistics
510209	Construction and Management of Nature Reserves	600416	General Aircraft Maintenance
510210	Woodworking Equipment Application Technology	600417	General Aviation Flight Technology
510211	Wood Processing Technology	600418	Aircraft structural repair
510212	Forestry Investigation and Information Processing	6005	Category of Pipeline Transport
510213	Forestry Information Technology and Management	600501	Pipeline Engineering Technology
5103	Category of Animal Husbandry and Veterinary Medicine	600502	Pipeline Transportation Management
510301	Animal Husbandry and Veterinarian	6006	Category of Urban Rail Traffic

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
510302	Animal Medicine	600601	Urban Rail Transit Vehicle Technology
510303	Animal Pharmacy	600602	Urban Rail Transit Electrical and Mechanical Technology
510304	Animal Epidemic Prevention and Quarantine	600603	Urban Rail Transit Communication Signal Technology
510305	Animal Medicine and Veterinary Medicine	600604	Urban Rail Transportation Supply and Distribution Technology
510306	Pet Care and Training Guide	600605	Urban Rail Transit Engineering Technology
510307	Laboratory Animal Technology	600606	Metro Operation Management
510308	Feed and Animal Nutrition	6007	Category of Postal
510309	Special Animal Breeding	600701	Postal Communications Management
510310	Animal Husbandry and Engineering Technology	600702	Express Operations Management
510311	Sericulture Technology	61	Main Category of Electronic Information
510312	Grass Industry Technology	6101	Category of Electronic Information
510313	Beekeeping and Bee Products Processing	610101	Electronic Information Engineering
510314	Economic Management of Animal Husbandry	610102	Applied Electronic Technology
5104	Category of Aquaculture	610103	Microelectronic Technology
510401	Aquaculture Technology	610104	Intelligent Product Development
510402	Marine Fishery Technology	610105	Intelligent Terminal Technology and Application
510403	Aquarium Science and Technology	610106	Intelligent Monitoring Technology
510404	Aquatic Animal Medicine	610107	Smart Car Technology
510405	Fishery Economic Management	610108	Electronic Products Quality Inspection

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
52	Main Category of Resources Environment and Safety	610109	Electronics Marketing Services
5201	Category of Resource Exploration	610110	Electronic Circuit Design and Technology
520101	Territory and Natural Resources Survey and Management	610111	Electronics Manufacturing Technology and Equipment
520102	Geological Survey and Mineral Survey	610112	Electronic Measurement Technology and Instruments
520103	Geology and Prospecting of Mineral Resources	610113	Electronic Technology and Management
520104	Analysis and Identification of Rock and Mineral	610114	Audio-visual Engineering Technology
520105	Identification and Processing of Gemstone	610115	Mobile Internet Application Technology
520106	Coalfield Geology and Prospecting Technology	610116	Optical Technology
5202	Category of Geology	610117	Photovoltaic Engineering
520201	Engineering Geological Investigation	610118	Optoelectronic Display Technology
520202	Hydrology and Engineering Geology	610119	Internet of Things Applications
520203	Drilling Technology	6102	Category of Computer
520204	Mining Geology	610201	Computer Application Technology
520205	Geophysical Prospecting Technology	610202	Computer Network Technology
520206	Investigation and Prevention of Geological Disasters	610203	Computer Information Management
520207	Environmental Geological Engineering	610204	Computer Systems and Maintenance
520208	Geotechnical Engineering Technique	610205	Software Technology
5203	Category of Surveying and Mapping Geographic Information	610206	Software and Information Services
520301	Engineering Measurement Technology	610207	Animation Production Technology

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
520302	Photogrammetry and remote sensing technology	610208	Embedded Technology and Applications
520303	Technology of Surveying and Mapping Engineering	610209	Digital Display Technology
520304	Geographic Information Technology	610210	Digital Media Applications
520305	Cadastral Mapping and Land Management	610211	Information Security and Management
520306	Mining Surveying	610212	Mobile Application Development
520307	Surveying and Mapping and Geotechnical Engineering	610213	Cloud Computing Technology and Applications
520308	Navigation and Location Service	610214	E-commerce Technology
520309	Cartography and Digital Communication Technology	6103	Category of Traffic
520310	Geographical Condition Monitoring Technology	610301	Communication Technology
520311	Geotechnical Investigation and Surveying	610302	Mobile Communication Technology
5204	Category of Oil and Gas	610303	Communication System Operation Management
520401	Drilling Technology	610304	Communications Engineering Design and Supervision
520402	Oil and Gas Recovery Technology	610305	Telecommunications Service and Management
520403	Oil and Gas Storage and Transportation Technology	610306	Optical Communication Technology
520404	Petroleum Geological Exploration Technology	610307	Things Engineering Technology
520405	Oilfield Chemical Application Technology	62	Main Category of Medicine and Health
520406	Petroleum Engineering Technology	6201	Category of Clinical Medicine
5205	Category of Coal	620101K	Clinical Medicine
520501	Coal Mining Technology	620102K	Oral Medicine

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
520502	Mine Construction	620103K	Traditional Chinese Medicine
520503	Mine Mechanical and Electrical Technology	620104K	Orthopedics
520504	Mine Ventilation and Safety	620105K	Acupuncture and Massage
520505	Comprehensive Mechanized Coal Mining	620106K	Mongolian Medicine
520506	Coal Preparation Technology	620107K	Tibetan Medicine
520507	Deep Processing and Utilization of Coal	620108K	Uygur Medical
520508	Coalification Analysis and Testing	620109K	Dai Medicine
520509	Coalbed Methane Production and Transportation Technology	620110K	Kazak Medical
520510	Mine Transportation and Hoisting	6202	Category of Nursing
5206	Category of Metal and Non-metallic Mineral	620201	Care
520601	Metallic and Non-metallic Mining Technology	620202	Midwifery
520602	Mineral Processing Technology	6203	Category of Pharmacy
520603	Mining Equipment Maintenance Technology	620301	Pharmacy
5207	Category of Meteorology	620302	Chinese Pharmacy
520701	Atmospheric Science and Technology	620303	Mongolian Pharmacy
520702	Atmospheric Sounding Technology	620304	Uygur Pharmacy
520703	Applied Meteorological Technology	620305	Tibetan Pharmacy
520704	Lightning Protection Technology	6204	Category of Medical Technology
5208	Category of Environmental Protection	620401	Medical Laboratory Technology

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
520801	Environmental Monitoring and Control Technology	620402	Medical Biotechnology
520802	Rural Environmental Protection	620403	Medical Imaging Technology
520803	Indoor Environment Detection and Control Technology	620404	Medical Cosmetology
520804	Environmental Engineering Technology	620405	Stomatology Technology
520805	Environmental Information Technology	620406	Inspection and Quarantine Technology
520806	Nuclear and Radiation Detection and Protection Technology	620407	Optometry Technology
520807	Environmental Planning and Management	620408	Radiation Therapy
520808	Environmental Assessment and Advisory Services	620409	Respiratory Therapy
520809	Pollution Remediation and Ecological Engineering Technology	6205	Category of Rehabilitation Therapy
520810	Clean Production and Emission Reduction Technology	620501	Rehabilitation Therapy
520811	Resource Comprehensive Utilization and Management Technology	620502	Speech and Hearing Rehabilitation Technology
5209	Category of Safety	620503	TCM Rehabilitation Technology
520901	Safety Health and Environmental Protection	6206	Category of Public Health and Health Management
520902	Chemical Safety Technology	620601K	Preventive Medicine
520903	Rescue Technology	620602	Public Health Management
520904	Safety Technology and Management	620603	Health Inspection
520905	Safety Evaluation and Supervision of Engineering	620604	Health Information Management
520906	Safety Production Monitoring and Control	6207	Category of Population and Family Planning

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
520907	Occupational Health Technology and Management	620701	Population and Family Development Services
53	Main Category of Energy Power and Materials	620702	Reproductive Health Services and Management
5301	Category of Electric Power Technology	6208	Category of Health Management and Promotion
530101	Power Plants and Power Systems	620801	Health Management
530102	Power Supply and Utility Technology	620802	Medical Nutrition
530103	Automation of Electric Power Systems	620803	Chinese Medicine Health Care
530104	Construction, Operation and Maintenance of HV Transmission and Distribution Lines	620804	Psychological Counseling
530105	Power System Relay Protection and Automation Technology	620805	Medical Equipment Applications
530106	Mechanical and Electrical Equipment and Automation of Hydropower Station	620806	Precision Medical Device Technology
530107	Power Grid Monitoring Technology	620807	Medical Equipment Maintenance and Management
530108	Electric Power Customer Service and Management	620808	Rehabilitation Engineering Technology
530109	Hydropower Station and Power Network	620809	Rehabilitation Technical Aids
530110	Power Conversion Technology and Application	620810	Prosthetics and Orthotics Technology
530111	Agricultural Electrification Technology	620811	Geriatric Care Management
530112	Distributed Generation and Microgrid Technology	63	Main Category of Finance Commerce
5302	Category of Thermal Energy and Power Generation Engineering	6301	Category of Finance and Taxation

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
530201	Thermal Power Plant for Power Plant	630101	Finance
530202	Urban Thermal Energy Application Technology	630102	Tax
530203	Operation and Maintenance of Nuclear Power Plant Power Equipment	630103	Asset Assessment and Management
530204	Thermal Power Plant Centralized Control Operation	630104	Government Procurement Management
530205	Chemical and Environmental Protection Technology	6302	Category of Finance
530206	Thermal Power Automation Technology in Power Plant	630201	Financial Management
5303	Category of New Energy Power Generation Project	630202	International Finance
530301	Wind Power Generation Technology	630203	Securities and Futures
530302	Wind Power System Operation and Maintenance	630204	Trust and Leasing
530303	Biomass Energy Application Technology	630205	Insurance
530304	Photovoltaic Power Generation Technology and Application	630206	Investment and Finance
530305	Industrial Energy Conservation Technology	630207	Credit management
530306	Energy Conservation Technology and Management	630208	Rural Finance
530307	Solar Thermal Technology and Application	630209	Internet Banking
530308	Rural Energy and Environmental Technology	6303	Category of Financial Accounting
5304	Category of Ferrous Material	630301	Financial Management
530401	Black Metallurgical Technology	630302	Accounting
530402	Rolling Engineering Technology	630303	Audit

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
530403	Application Technology of Iron and Steel Metallurgical Equipment	630304	Accounting Information Management
530404	Quality Inspection of Metallic Materials	6304	Category of Statistics
530405	Comprehensive Utilization of Iron Ore Resource	630401	Information Statistics and Analysis
5305	Category of Nonferrous Metal Materials	630402	Statistics and Accounting
530501	Nonferrous Metals Technology	6305	Category of Trade and Economic
530502	Nonferrous Metallurgical Equipment Application Technology	630501	International Trade Practice
530503	Metal Pressure Processing	630502	International Economy and Trading
530504	Metal Precision Molding Technology	630503	International Business
5306	Category of Non-metallic Material	630504	Service Outsource
530601	Materials Engineering Technology	630505	Economic Information Management
530602	Polymer Materials Engineering Technology	630506	Customs and International Freight
530603	Composite Engineering Technology	630507	Business Brokers and Agents
530604	Nonmetal Mineral Materials Technology	630508	International Cultural Trade
530605	Preparation of Photovoltaic Materials	6306	Category of Business Administration
530606	Carbon Processing Technology	630601	Business Administration
530607	Preparation of Silicon Materials	630602	Business Management
530608	Rubber Engineering Technology	630603	Technical Inspection
5307	Category of Building Material	630604	Chain Operation Management
530701	Building Materials Engineering Technology	630605	Market Management Services

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
530702	Testing Technology of Building Materials	630606	Brand Agents Operating
530703	Building Decoration Materials Technology	6307	Category of Marketing
530704	Application of building material equipment	630701	Marketing
530705	New Building Materials Technology	630702	Automotive Marketing Services
530706	Production and Management of Building Materials	630703	Advertising and Marketing Planning
54	Main Category of Civil Construction	630704	Tea and Tea Marketing
5401	Category of Architectural Design	6308	Category of E-commerce
540101	Architectural Design	630801	E-commerce
540102	Architectural Decoration Engineering Technology	630802	Mobile Commerce
540103	Ancient Building Engineering Technology	630803	Internet Marketing
540104	Architectural Interior Design	6309	Category of Logistics
540105	Landscape Architecture Design	630901	Logistics Engineering Technology
540106	Landscape Engineering Technology	630902	Logistics Information Technology
540107	Building Animation and Model Making	630903	Logistics Management
5402	Category of Urban and Rural Planning and Management	630904	Logistics Finance Management
540201	Urban and Rural Planning	630905	Engineering Logistics Management
540202	Villages and Towns Construction and Management	630906	Cold Chain Logistics Technology and Management
540203	Urban Informatization Management	630907	Purchasing and Supply Management
5403	Category of Civil Construction	64	Main Category of Tourism

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
540301	Construction Technology	6401	Category of Tourism
540302	Underground and tunnel engineering	640101	Tourism Management
540303	Testing Technology of Civil Engineering	640102	Guide
540304	Steel Construction Technology	640103	Travel agency management
5404	Category of Construction Equipment	640104	Resort Development and Management
540401	Construction Equipment Engineering Technology	640105	Hotel Management
540402	Heating Ventilating and Air Conditioning Engineering Technology	640106	Leisure Services and Management
540403	Building Electrical Engineering Technology	6402	Category of Catering
540404	Intelligent Building Technology	640201	Restaurant Management and Service
540405	Industrial Equipment Installation Engineering Technology	640202	Cooking Technique and Nutrition
540406	Fire Engineering and Technology	640203	Nutritious Meals
5405	Category of Construction Project Management	640204	In the west of Point Technology
540501	Construction Project Management	640205	Western Technology
540502	Engineering Cost	6403	Category of Exhibition
540503	Construction Economic Management	640301	Exhibition Planning and Management
540504	Informatization Management of Construction Project	65	Main Category of Culture and Art
540505	Construction Project Supervision	6501	Category of Arts and Design
5406	Category of Municipal Engineering	650101	Art Design
540601	Municipal Engineering Technology	650102	Visual Communication Design and Production

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
540602	Urban Gas Engineering Technology	650103	Advertising Design and Production
540603	Water Supply and Drainage Engineering Technology	650104	Digital Media Art and Design
540604	Environmental Sanitation Engineering Technology	650105	Product Design Art
5407	Category of Real Estate	650106	Furniture Art Design
540701	Real Estate Management and Management	650107	Leather Art and Design
540702	Real Estate Testing and Valuation	650108	Clothing and apparel design
540703	Property Management	650109	Interior Art Design
55	Main Category of Water Conservancy	650110	Gallery Art and Design
5501	Category of Hydrology and Water Resources	650111	Environmental Art and Design
550101	Hydrology and Water Resources Engineering	650112	Public Art and Design
550102	Hydrological Forecasting Technology	650113	Sculpture Design
550103	Water Resources Management	650114	Package Art and Design
5502	Category of Water Conservancy and Management	650115	Ceramic Design and Technology
550201	Water Conservancy Engineering	650116	Embroidery Design and Technology
550202	Water Resources and Hydropower Engineering	650117	Jade Design and Technology
550203	Water Resources and Hydropower Engineering Management	650118	Jewelry Design and Technology
550204	Water Resources and Hydropower Engineering	650119	Arts and Crafts Design
550205	Electromechanical Irrigation and Drainage Engineering Technology	650120	Animation Design
550206	Harbor Channel and River Regulation Project	650121	Game Design

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
550207	Water Management	650122	Characters Design
5503	Category of Water Conservancy and Hydropower Device	650123	Beauty and Body Art
550301	Hydroelectric Power Station	650124	Photography and Imaging Art
550302	Electrical Equipment for Hydropower Stations	650125	Art
550303	Hydropower Station Operation and Management	6502	Category of Performing Arts
550304	Operation and management of water conservancy electromechanical equipment	650201	Performance Art
5504	Water Conservation and Water Environment	650202	Drama Television Show
550401	Soil and Water Conservation Technology	650203	Singing and Dancing
550402	Water Environment Monitoring and Control	650204	Opera Performances
56	Main Category of Equipment Manufacturing	650205	Folk Art Performances
5601	Category of Mechanical Design and Manufacturing	650206	Musical Performances
560101	Mechanical Design and Manufacturing	650207	Dance Performance
560102	Mechanical Manufacturing and Automation	650208	Ballroom Dancing
560103	Numerical control technology	650209	Fashion Show
560104	Precision Machinery Technology	650210	Model and Etiquette
560105	Special Processing Technology	650211	Modern Pop Music
560106	Material Forming and Control Technology	650212	Composer Technology
560107	Metal Materials and Heat Treatment Technology	650213	Music Production
560108	Foundry Technology	650214	Piano Accompaniment

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
560109	Forging technology	650215	Piano Tuning
560110	Welding Technology and Automation	650216	Choreographer
560111	Inspection Technology of Mechanical Products	650217	Opera Director
560112	Physical Testing and Chemical Analysis	650218	Stage Art Design and Production
560113	Mold design and manufacturing	650219	Music Performance
560114	Electric Machines and Electric Instruments Technology	6503	Category of National culture
560115	Wire and Cable Manufacturing Technology	650301	National Performing Arts
560116	Internal Combustion Engine Manufacturing and Maintenance	650302	Ethnic Art
560117	Mechanical Equipment Manufacturing Technology	650303	Ethnic Clothing and Apparel
560118	Industrial Design	650304	National Residential Decoration
560119	Industrial Engineering Technology	650305	National Traditional Craftsmanship
5602	Category of Electromechanical Equipment	650306	Minority Ancient repair
560201	Application of Automated Production Equipment	650307	Chinese Minority Language and Culture
560202	Mechanical and Electrical Equipment Installation Technology	6504	Category of Cultural Services
560203	Mechanical and Electrical Equipment Maintenance and Management	650401	Cultural Creativity and Planning
560204	Application and Maintenance of Numerical Control Equipment	650402	Cultural Market Management
560205	Refrigeration and Air Conditioning Technology	650403	Public Cultural Services and Administration

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
560206	Optoelectronic Manufacturing and Application Technology	650404	Conservation and Protection
560207	New Energy Equipment Technology	650405	Archaeological Digging Technology
5603	Category of Automation	650406	Heritage Museum Service and Management
560301	Mechatronics Technology	650407	Books File Management
560302	Electrical Automation Technology	66	Main Category of News Media
560303	Industrial Process Automation Technology	6601	Category of Press and Publication
560304	Intelligent Control Technology	660101	Graphic Information Processing
560305	Industrial Network Technology	660102	Network News and Spread
560306	Industrial Automation Instrumentation	660103	Layout Editing and Proofreading
560307	Hydraulics and Pneumatics	660104	Publishing Business
560308	Elevator Engineering Technology	660105	Publishing and Editing Computer Technology
560309	Industrial Robotics Technology	660106	Publication Information Management
5604	Category of Railway Equipment	660107	Digital Publishing
560401	Manufacture and Maintenance of Railway Rolling Stock	660108	Digital Media Device Manager
560402	Manufacture and Maintenance of Railway Communication Signal Equipment	6602	Category of Radio and Television
560403	Railway Construction and Maintenance Machinery Manufacturing and Maintenance	660201	News Editing and Production
		660202	Broadcasting and Hosting
5605	Category of Ships and Marine Engineering Equipment	660203	Radio and Television Program Production

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
560501	Ship Engineering Technology	660204	Radio and Television Technology
560502	Ship Machinery Engineering Technology	660205	Television Production Management
560503	Ship Electrical Engineering Technology	660206	Film director
560504	Ship Outfitting Engineering Technology	660207	Television Art
560505	Ship Painting Engineering Technology	660208	Video Multimedia
560506	Yacht design and manufacturing	660209	Television Animation
560507	Marine Engineering Technology	660210	Television lighting technology and art
560508	Ship Communication and Navigation	660211	Audio Technology
560509	Ship Power Engineering Technology	660212	Recording technology and art
5606	Category of Aviation Equipment	660213	Photographic camera technology
560601	Aircraft Manufacturing Technology	660214	Communication and Planning
560602	Aircraft Maintenance Technology	660215	Media Marketing
560603	Aeroengine Manufacturing Technology	67	Main Category of Education and Sports
560604	Aeroengine Test Technology	6701	Category of Education
560605	Aeroengine Maintenance Technology	670101K	Early Education
560606	Manufacturing Technology of Airplane Equipment	670102K	Pre-school education
560607	Maintenance Technology of Airplane Equipment	670103K	Primary education
560608	Avionics Electrical and Electronic Technology	670104K	Language Education
560609	Precision Molding Technology for Aeronautical Materials	670105K	Mathematics Education
560610	UAV application technology	670106K	English education

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
560611	Missile Repair	670107K	Physics Education
5607	Category of Automobile Manufacturing	670108K	Chemistry Education
560701	Automotive Manufacturing and Assembly Technology	670109K	Biology Education
560702	Vehicle Inspection and Repair Technology	670110K	History Education
560703	Automotive Electronic Technology	670111K	Geography Education
560704	Automotive Molding Technology	670112K	Musical Education
560705	Automotive Test Technology	670113K	Art Education
560706	Car modification Technology	670114K	Physical Education
560707	New Energy Vehicle Technology	670115K	Politics Education
57	Main Category of Biological and Chemical	670116K	Dance Education
5701	Category of Biotech	670117K	Art Education
570101	Food Biotechnology	670118K	Special Education
570102	Chemical Biotechnology	670119K	Science Education
570103	Pharmaceutical Biotechnology	670120K	Modern Educational Technology
570104	Agricultural Biotechnology	670121K	Mental Health Education
570105	Inspection and Quarantine of Biological Products	6702	Category of Language
5702	Category of Chemical Technology	670201	Chinese
570201	Applied Chemical Technology	670202	Business English
570202	Petroleum Refining Technology	670203	Applied English
570203	Petrochemical Technology	670204	Tourism English
570204	Polymer Synthesis Technology	670205	Business Japanese
570205	Fine Chemical Technology	670206	Applied Japanese

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
570206	Marine Chemical Technology	670207	Tourism Japanese
570207	Industrial Analysis Technology	670208	Applied Korean
570208	Chemical Equipment Technology	670209	Applied Russian
570209	Chemical Industry Automation	670210	Applied French
570210	Painting Protection Technology	670211	Applied German
570211	Fireworks and Firecrackers Technology and Management	670212	Applied Spanish
570212	Coal Chemical Technology	670213	Applied Vietnamese
58	Main Category of Textile and Light Industry	670214	Applied Thai
5801	Category of Light Chemical	670215	Applied Arabic
580101	Polymeric Materials Processing Technology	670216	Applied Foreign Languages
580102	Pulp and Paper Technology	6703	Category of Secretary
580103	Spice Flavor Process	670301	Secretary
580104	Surface Finishing Process	670302	Secretary High speed record
580105	Furniture Design and Manufacturing	6704	Category of Sports
580106	Cosmetic Technology	670401	Sports Training
580107	Leather Processing Technology	670402	Sports Protection
580108	Manufacture and Technology of Leather Goods	670403	Social Sports
580109	Footwear Design and Technology	670404	Leisure Sports
580110	Musical Instrument Manufacture and Maintenance	670405	Golf and Management
580111	Ceramic Manufacturing Process	670406	National Traditional Sports
5802	Category of Packaging	670407	Sports Art Performance

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
580201	Packaging Engineering Technology	670408	Operation and management Sports
580202	Packaging Planning and Design	670409	Physical Health and Rehabilitation
580203	Application Technology of Packaging Equipment	670410	Fitness Instruction and Management
580204	Food Packaging Technology	68	Main Category of Public Security and Judicial
5803	Category of Printing	6801	Category of Public Security Management
580301	Digital Graphic Information Technology	680101K	Security Management
580302	Application Technology of Printing Equipment	680102K	Traffic Management
580303	Print Media Design and Production	680103K	Information Network Security Supervision
580304	Print Media Technology	680104K	Fire Management
580305	Digital Printing Technology	680105K	Frontier Inspection
5804	Category of Textile and Clothing	680106K	Border Management
580401	Modern Textile Technology	680107K	SWAT
580402	Silk Technology	680108K	Police Administration
580403	Dyeing and Finishing Technology	680109K	Public Safety Management
580404	Textile Mechanical and Electrical Technology	680110K	Forest Fire
580405	Textile Inspection and Trade	680111K	Force Logistics Management
580406	Textile Design	680112K	Political Work Force
580407	Household Textile Design	6802	Category of Public Security Commanding
580408	Textile Materials and Application	680201K	Police Commanding and Tactics
580409	Knitting Technology and Knitted Garments	680202K	Frontier Defense Commanding
580410	Clothing Design and Technology	680203K	Ship Command

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
580411	Manufacture and Technology of Leather Garment	680204K	Communication Command
580412	Clothing Display and Design	680205K	Fire Protection Commanding
59	Main Category of Food and Drug	680206K	Staff Officer
5901	Category of Food Industry	680207K	Rescuing
590101	Food Processing Technology	6803	Category of Public Security Technology
590102	Brewing Technology	680301K	Criminal Science and Technology
590103	Food Quality and Safety	680302K	Police Dog Technology
590104	Food Storage and Marketing	6804	Category of Investigation
590105	Food Testing Technology	680401K	Criminal Investigation
590106	Food Nutrition and Hygiene	680402K	Domestic Security
590107	Food Nutrition and Detection	680403K	Economic Crime Investigation
5902	Category of Pharmaceutical Manufacturing	680404K	Drug control
590201	Production and Processing of Traditional Chinese Medicine	6805	Category of Legal Practice
590202	Pharmaceutical Production Technology	680501	Judicial Assistants
590203	Veterinary Drug Technology	680502	Legal Secretary
590204	Drug Quality and Safety	680503	Legal Affairs
590205	Pharmaceutical Equipment Application Technology	680504	Attorney Services
5903	Category of Food and Drug Management	6806	Category Law Enforcement
590301	Drug Administration and Management	680601K	Criminal Execution
590302	Pharmaceutical Service and Management	680602	Civil Execution
590303	Development and Management of Health Products	680603K	Chief Executive

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
590304	Cosmetics Management and Management	680604K	Judicial Police
5904	Category of Food Industry	680605	Community Corrections
590401	Grain Engineering Technology	6807	Category of Judicial technology
5905	Category of Grain Storage	680701K	Criminal Investigation Technology
590501	Grain Storage and Detection Technology	680702	Security Technology
60	Main Category of Transportation	680703K	Judicial Information Technology
6001	Category of Railway Transport	680704	Judicial Expertise
600101	Railway locomotive	680705K	Judicial Information Security
600102	Railway Vehicles	680706K	Psychological Measurement and Correction Technology for Prisoners
600103	Railway Power Supply Technology	680707K	Treatment Technology for Drug Rehabilitation
600104	Railway Engineering Technology	680708	Duty Crime Prevention and Control
600105	Railway Mechanization Maintenance Technology	69	Main Category of Public Administration and Service
600106	Railway Signal Automatic Control	6901	Category of Public Utilities
600107	Railway Communication and Information Technology	690101	Social Work
600108	Railway Transportation Operation and Management	690102	Social Welfare Management
600109	Railway Logistics Management	690103	Youth Work and Management
600110	Railway Bridge and Tunnel Engineering Technology	690104	Community Management and Service
600111	High Speed Railway Engineering Technology	690105	Public Relations
600112	High-speed Railway Passenger Crew	690106	People's Armed Forces

(continued)

Table 4.6 (continued)

Specialty code	Specialty name	Specialty code	Specialty name
600113	Maintenance Technology of Bullet Train	6902	Category of Public Administration
6002	Category of Road Transport	690201	Civil Administration
600201	Application of Intelligent Transportation Technology	690202	Human Resource Management
600202	Road and Bridge Engineering Technology	690203	Labor and Social Security
600203	Road Transport and Road Administration	690204	Network Public Opinion Monitoring
600204	Road Maintenance and Management	690205	Public Affairs Management
600205	Highway Construction Technology of Mechanization	690206	Administrative Management
600206	Construction Machinery Technology Application	690207	Quality Management and Certification
600207	Traffic Operations Management	690208	Intellectual Property Management
600208	Transportation hub operations management	6903	Category of Public Service
600209	Vehicle use and Maintenance Technology	690301	Elderly Services and Management
600210	Auto Body Repair Technology	690301	Housekeeping Service and Management
600211	Automobile Application Security Management	690303	Wedding Services and Management
600212	New Energy Vehicle Use and Maintenance	690304	Community Rehabilitation
6003	Category of Water Transport(Continue)	690305	Modern Funeral Technology and Management

Table 4.7 Specialty setup of the secondary vocational education

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
<i>01 Category of Agriculture, Forestry, Husbandry and Fishery</i>			
010100	Facility agricultural production technology	Facility agricultural cultivation Facility crops disease and pest control	3
010200	Modern Agricultural Technology	Crops production and operation Cash crops production and operation Crop resource comprehensive exploitation Crops pest control	3
010300	Sightseeing agriculture management	Sightseeing agriculture Production and development Ornamental crops cultivation Regional planning and construction of Sightseeing agriculture Sightseeing agricultural garden tour guide	3
010400	Circular Agriculture Production and Management	Circular Agriculture planning and design Circular Agriculture production technology and techniques Rural renewable resources development and exploitation Rural new resources exploitation technology	3
010500	Seed production and management	Seed breeding and cultivation Seed processing and testing Seed sales and after-service provision	3
010600	Plant protection	Plant pest prediction Plant pest control Plant quarantine and inspection	3
010700	Fruit and vegetable flower production technology	Fruit tree cultivation Pollution free fruit production Vegetable cultivation Organic vegetable production Flower cultivation Fresh cut flowers production Edible mushroom cultivation Facility gardening Plants tissue culture	3
010800	Tea production and processing	Organic tea production and tea garden management Tea processing Tea quality inspection Tea business operation and marketing	3
010900	Sericulture production and management	Mulberry seedlings breeding Mulberry cultivation Silkworms raising Silkworm egg breeding	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
011000	Chinese herbal medicine planting	Chinese medical herbs seeds production Chinese medical herbs standardized planting Chinese medical herbs sales and management Chinese medical herbs identification and processing	3
011100	Cotton Processing and Inspection	Pollution free cotton seed breeding Cotton purchase quality inspection Seed cotton first processing Cotton fiber quality inspection Grinned cotton storage and transportation	3
011200	Tobacco production and processing	Tobacco production Tobacco processing	3
011300	Modern Forestry Technology	Forest cultivation Nursery stock production and operation Forest disease and pest control Forestry management Forest eco-tourism	3
011400	Protection and Management of Forest Resources	Nature reserve management Wild animals and plants protection Forest multi-variety operation Forest protection and eco-tourism	3
011500	Garden Technology	Garden planning, design and construction Garden project bidding and tendering, project budget Garden construction engineering Garden project supervision	3
011600	Landscaping	Garden plants landscape design Nursery plants and lawns production and operation Garden plants cultivation and maintenance	3
011700	Wood processing	Wood production Bamboo wood processing Bamboo and woodwork ornament	3
011800	Livestock and Poultry Production and Disease Control	Livestock husbandry and cultivation Poultry husbandry and cultivation Livestock and Poultry disease control Veterinary drugs and feeds marketing Farm environment and its control	3
011900	Special animal husbandry	Special animal production and experimental animal production	3
012000	Animal Science and Veterinary Medicine	Animal and poultry production and operation feeds production and operation Animal disease prevention Chinese veterinarian Animal epidemic prevention and quarantine Animal and poultry breeding Veterinary Medicine marketing	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
012100	Pet conservation and management	Pet breeding and raising Pet epidemic prevention and quarantine	3
012200	Freshwater aquaculture	Pollution free fresh water aquaculture Special freshwater aquaculture Aquarium fish aquaculture Freshwater disease prevention	3
012300	Seawater ecological farming	Seawater aquaculture Seawater shellfish aquaculture Shrimp and crab aquaculture Seawater disease prevention and treatment	3
012400	Nautical fishing	Ocean fishery Fishing tackles and equipment production and maintenance	3
012500	Preservation and Processing of Agricultural Products	Grain and oil specialties processing Animal and poultry specialties processing Fruits and vegetables storage and processing Aquatic products processing	3
012600	Marketing and Storage of Agricultural Products	Farm Produce purchase Farm Produce preservation Farm Produce storage and transportation Farm Produce sales Farm Produce cold-chain logistics	3
012700	Agricultural machinery use and maintenance	Agricultural machinery application Agricultural machinery maintenance Agricultural machinery marketing	3
012800	Rural Electric Technology	Rural Electric utility design and construction Rural Electric utility management and maintenance	3
012900	Agriculture and rural water use	Rural water infrastructure project Rural field irrigation project Safe drinking water technology	3
013000	Rural Environmental Monitoring	Rural soil Environment Monitoring Rural water Environment Monitoring Rural atmosphere Environment Monitoring	3
013100	Comprehensive management of rural economy	Rural cooperation agent Rural enterprises financial management Village-level economic management Rural social intermediary service	3
013200	Chain Management and Management of Agricultural	Agricultural means of production operation Farm produce operation Farm produce operation Farm produce management	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
<i>02 Category of Resources and Environment</i>			
020100	Land and Resources Investigation	Mine resources investigation and management Land management Cadastral surveying and mapping	3
020200	Geological Survey and Prospecting	Mining geology Mineral exploitation Geochemistry prospecting Radioactive mineral surveying and exploration	3
020300	Hydrogeology and Engineering Geological Prospecting	Hydrogeology prospecting Engineering geological prospecting	3
020400	Geophysical Prospecting	Engineering geophysical prospecting Geophysical logging	3
020500	Drilling Engineering Technology	Solid mineral resource drilling Hydrological well drilling Engineering geological construction and drilling	3
020600	Tunneling technology	Blasting engineering technology	3
020700	Geotechnical Engineering Survey and Construction	Geotechnical Engineering Surveying Geotechnical Engineering construction	3
020800	Geological Hazard Investigation and Treatment Construction	Geological Hazard evaluation and assessment Geological Hazard prevention and treatment	3
020900	Cartography and Geographic Information System	Cartography Geographic Information System Surveying and mapping information digitization	3
021000	Geology and Surveying	Mining Geology Mining surveying	3
021100	Hydrology and Water Resources Survey	Hydrological surveying Water quality inspection Local water issue management	3
021200	Mining Technology	Coalfield exploitation Uranium mine exploitation Metal mine exploitation Non-metal mine exploitation	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
021300	Mining machinery operation and maintenance	Mining machinery operation Mining machinery maintenance Mining machinery equipment sales and service	3
021400	Mine Electromechanical Engineering	Mine Electromechanical equipment installation and debugging Mine Electromechanical equipment functioning and maintenance Mine Electromechanical equipment sales and service	3
021500	Mine Ventilation and Safety	Mineral well security technology Rescue techniques	3
021600	Mine construction		3
021700	Comprehensive Utilization of Coal	Coal dressing Coal coking and product recycling Coal chemistry Coalbed methane extraction technology	3
021800	Environmental Monitoring Technology	Water and waste water monitoring technology Air and exhaust gas monitoring technology Soil and solid waste monitoring technology Noise and vibration monitoring technology Biological environment monitoring technology Radiation monitoring and prevention technology Indoor environmental monitoring and treatment technology	3
021900	Environmental Management	Enterprise environmental management Local units environmental management	3
022000	Environmental Control Technology	Waste water pollution control technology Waste gas pollution control technology Solid waste pollution control technology	3
022100	Ecological Environment Protection	Water and soil Conservation Ecological Environment	3
022200	Meteorological services	Agricultural Meteorological services Automatic observation equipment maintenance Meteorological movie and TV production	3
022300	Thunder and lightning protection technology	Lightening protection project construction Lightening protection facilities testing Lightening protection products marketing	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
<i>03 Category of Energy and New Energy</i>			
030100	Oil drilling	Ocean drilling	3
030200	Oil and gas exploitation	Oil exploitation Gas exploitation	3
030300	Petroleum Geological Logging and Logging		3
030400	Oil and Gas Storage and Transportation	Oil Storage and Transportation Gas Storage and Transportation Oil and gas pipeline protection	3
030500	Operation and Maintenance of Thermal Equipment in Thermal Power Plant	Boiler equipment functioning and maintenance Steam turbine equipment inspection	3
030600	Thermal Power Plant Installation	Boiler equipment installation Steam turbine equipment installation	3
030700	Installation and Maintenance of Thermal Instrumentation for Thermal Power Plant	Installation and testing of Thermal Instrumentation for Thermal Power Plant Thermodynamic metering	3
030800	Thermal power plant centralized control operation		3
030900	Water Treatment and Chemical Supervision in Thermal Power Plants	Water Treatment in Thermal Power Plants Chemical Supervision in Thermal Power Plants	3
031000	Installation and Operation of Electromechanical Equipment in Hydropower Plant	Electromechanical Equipment installation in Hydropower Plant Electromechanical Equipment functioning and maintenance in Hydropower Plant	3
031100	Installation and Operation of Electromechanical Equipment in Water Pump Station	Electromechanical Equipment Installation in Water Pump Station Electromechanical Equipment functioning and maintenance in Water Pump Station	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
031200	Reactors and nuclear power plants	Nuclear power production Environmental radioactive inspection	3
031300	Operation and Maintenance of Electromechanical Equipment in Wind Farm		3
031400	Utilization of solar energy and biogas technology	Solar energy exploitation Renewable resource exploitation	3
031500	Electrical equipment for power plants and substations	Operation and maintenance of Electrical equipment for power plants and substations Examination and repair of Electrical equipment for power plants and substations	3
031600	Relay protection and automatic device debugging and maintenance	Relay protection and automatic device debugging Relay protection and automatic device operation and maintenance	3
031700	Transmission and Distribution Line Construction and Operation	Aerial transmission and distribution line Construction and Operation Electric power cable Construction and Operation	3
031800	Power technology	Urban and rural power supply and consumption Rural power grid network Power supply and consumption for industrial and mining enterprises	3
031900	Power Marketing	Power marketing management Power sales service Rural power grid marketing	3
<i>04 Category of Civil Engineering and Water Conservancy</i>			
040100	Construction work	Construction techniques and security management Construction work quality and material inspection Construction work supervising	3-4
040200	Architectural Decoration	Architectural decoration design and drawing Architectural decoration construction Architectural model making Indoor ornaments	3
040300	Ancient Building Renovation and rebuilding	Ancient building protection and renovation Ancient Building oil painting and color painting techniques and technology Ancient Building rebuilding Ancient Building project information and material management	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
040400	Township construction	Township construction Village and town planning Township construction assessment	3
040500	Project costs	Building construction measurement and valuation Installation measurement and valuation Decoration measurement and valuation	3
040600	Construction equipment installation	Heating supply system installation and testing Building water and electric facility maintenance Measurement and valuation for water and electric facility installation	3
040700	Building intelligent equipment installation and operation	Building intelligent equipment installation and testing Security system installation and testing Building intelligent equipment operation and management Building intelligent project measurement and valuation	3
040800	Heating Ventilation and Air Conditioning Construction	Heating Ventilation and Air Conditioning Construction and management Air conditioner Refrigeration system operation and management	3-4
040900	Architectural performance	Architectural modeling and drawing Architectural animation and follow-up production Architectural information modeling and management	3
041000	Urban Gas Transmission and Distribution and Its Application	Gas station operation and management Gas network operation and maintenance Gas marketing and service	3
041100	Construction and Operation of Water Supply and Drainage Works	Water Supply and Drainage operation and maintenance Water Supply and Drainage works construction Water drainage electromechanical equipment installation and repair Water supply marketing and management	3-4
041200	Municipal engineering construction	Municipal road and bridge construction and maintenance Municipal pipe construction and maintenance Municipal rail transportation work construction Municipal engineering quality and security management	3-4
041300	Road and Bridge Construction		3
041400	Railway Construction and Maintenance	Railway bridge Construction and Maintenance Railway transit route Construction and Maintenance Urban rail Construction and Maintenance	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
041500	Water Conservancy and Hydropower Engineering Construction	Water Conservancy operation and Maintenance Construction technique security management Construction work quality and material inspection Construction work supervision Water Conservancy and Hydropower Engineering project cost	3-4
041600	Engineering survey	Project exploration Geographical and cadastral surveying and mapping	3
041700	Civil engineering inspection	Civil engineering material inspection Civil engineering project quality control	3
041800	Application and Maintenance of Construction Machinery	Construction Machinery marketing and leasing Construction Machinery Maintenance and management Building crane machinery loading and unloading operation	3
<i>05 Category of Processing and Manufacturing</i>			
050100	Iron and steel smelting	Sintering and palletizing Iron smelting Steel smelting Ferrous alloy smelting	3-4
050200	Metal pressed work processing	Ferrous metal pressed work Non-Ferrous metal pressed work Metal product manufacturing	3-4
050300	Engineering Materials Testing Technology	Material chemical inspection Metal material physical inspection Inorganic non-metal material physical inspection Energy conservation and environmental inspection	3
050400	Steel equipment operation and maintenance	Steel smelting machinery Steel rolling machinery Ferrous metal pressed work processing equipment and technology	3-4
050500	Non-ferrous Equipment Operation and Maintenance	Non-Ferrous metal smelting equipment Non-Ferrous metal pressed work processing equipment and technology	3
050600	Operation and Maintenance of Building Material Equipment	Cement equipment technology Glass equipment technology Pottery equipment technology Walling material equipment technology	3-4
050700	Non-ferrous metal smelting	Heavy non-ferrous metal smelting Light non-ferrous metal smelting Rare precious metal smelting Rare earth metal smelting Gold smelting	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
050800	Building and Construction Materials	Cementations material Waterproof material Composite material Decorative material	3–4
050900	Silicate Process and Industrial Control	Cement processing Glass processing Ceramic processing Fire resistant material processing	3–4
051000	Mineral Processing Technology	Metal mine dressing Nonmetal mine dressing	3–4
051100	Mechanical Manufacturing Technology	General Mechanical Manufacturing engineering mechanical manufacturing Chemical mechanical manufacturing Metallurgical mechanical manufacturing Agricultural mechanical manufacturing Light industry mechanical manufacturing Textile industry mechanical manufacturing Mechanical products remanufacturing technology	3–4
051200	Machining Technology	General machine tool processing Numerical control processing Special machine processing	3
051300	Electromechanical Technology Application	Electromechanical equipment installation and testing Automatic assembly line operation Electromechanical product maintenance Electromechanical product marketing	3–4
051400	Application of Numerical Control Technology	Numerical control turning processing Numerical control milling processing Processing center processing Numerical control machine tool installation, testing and maintenance	3–4
051500	Mold Manufacturing Technology	Cold pressing mold manufacturing Cavity mold manufacturing Mold manufacturing installation, testing and maintenance	3–4
051600	Mechanical and electrical equipment installation and maintenance	General mechanical and electrical equipment installation and maintenance Logistics equipment use and maintenance Lift installation and maintenance Mechanical and electrical equipment management and marketing	3–4

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
051700	Automobile Manufacturing and Maintenance	Automobile assembly and testing Automobile Sheet metal and coating Automobile marketing Motorcycle manufacturing and maintenance Electric vehicle manufacturing and maintenance Tractor manufacturing and maintenance	3-4
051800	Automotive Electronic Technology Application	Automobile intelligence management system installation and maintenance Automobile electric testing and maintenance	3-4
051900	Shipbuilding and Repair	Ship outfitting Shipbuilding Ship repair	3-4
052000	Ship machinery installation and maintenance	Ship tube building	3-4
052100	Metal thermal processing	Casting Forging Welding Metal thermal treatment	3-4
052200	Application of Welding Technology	General welding Special welding Welding automation	3-4
052300	Application of Inspection Technology of Electromechanical Products	Nondestructive Testing Pressure container testing	3-4
052400	Application of Metal Surface Treatment Technology	Cladding technology Coating technology	3-4
052500	Industrial Automation Instruments and Applications	Industrial Automation Instruments manufacturing Industrial Automation Instruments marketing Industrial Automation Instruments installation and testing	3-4
052600	Medical equipment installation and maintenance	Medical equipment maintenance and testing Medical equipment maintenance and management Medical equipment product marketing	3-4
052700	Electrical machinery manufacturing and maintenance	Electric machine manufacturing and maintenance Electric appliance manufacturing and maintenance Transformer manufacturing Electric wire and cable manufacturing	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
052800	Optical equipment manufacturing and maintenance	Optical equipment manufacturing and application Optical equipment marketing	3
052900	Refrigeration and air conditioning equipment operation and maintenance	Air conditioning equipment installation and maintenance Central air-conditioning operation management	3-4
053000	Electrical Operation and Control	Electrical control system operation and maintenance Electrical equipment installation and maintenance Power supply system operation and maintenance Lift operation and maintenance	3-4
053100	Electric Technology Application	Electrical equipment installation and maintenance Transformer device installation and maintenance Enterprise power supply technology Architectural electricity installation and maintenance	3
053200	Application and Maintenance of Electronic and Electrical Appliances	Audio and video products application and maintenance Daily electrical appliance application and maintenance Office automation equipment application and maintenance	3
053300	Electronic materials and components manufacturing	Electric light technology Electronic materials manufacturing technology Electronic components manufacturing technology	3
053400	Microelectronic Technology and Device Manufacturing		3-4
<i>06 Category of Petrochemical</i>			
060100	Chemical Technology	Petroleum chemical industry Basic organic chemical industry Inorganic chemical industry Coal chemical industry Natural gas chemical industry Salt chemical industry Macromolecule chemical industry	3-4
060200	Industrial Analysis and Inspection	Chemical industry analysis Quality inspection	3-4
060300	Oil refining		3-4

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
060400	Chemical Machinery and Equipment	Chemical Machinery installation and maintenance Chemical pipeline installation and pressure test Chemical productive device maintenance Chemical equipment erosion prevention Chemical machinery inspection and malfunction diagnosis	3-4
060500	Chemical Instrumentation and Automation	Chemical Instrumentation and Automation system installation and maintenance Chemical Instrumentation and Automation products marketing	3-4
060600	Fine Chemicals	Chemical pharmacy Daily chemical industry Coating material and adhesive material Food additives Feed additives Fine chemical products marketing	3-4
060700	Biochemical Engineering	Biochemical pharmacy technology	3-4
060800	Polymer materials processing technology	Plastic processing technique Rubber processing technique Macromolecule composite material processing technique	3-4
060900	Rubber technology		3
061000	Chemical Industry of Forest Products		3
061100	Nuclear and Chemical Engineering		3
061200	Explosive Technology	Explosive Technology application Civil blasting material management and security technology	3
061300	Fireworks production and management	Fireworks production Fireworks production technology and security management Fireworks operation	3
<i>07 Category of Textile and Food</i>			
070100	Pulp and Papermaking Technology	Pulp processing technology Papermaking technology Papermaking analysis and inspection Pulp and papermaking machine use and maintenance management	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
070200	Print Media Printing Technology	Printing technology Preprinting design and production Computer plate making Special printing Printing equipment use and maintenance	3
070300	Plastic molding	Plastic molding mould pattern Plastic molding technology Plastic raw material and product inspection	3
070400	Textile Technology and Marketing	Spinning technology Weaving technology Textile machinery maintenance and management Textile product design Textile product inspection Textile product marketing	3
070500	Textile polymer materials technology	Chemical fiber technology Textile composite material technology	3
070600	Silk craft	Silk making technology Silk weaving technology Silk spinning technology	3
070700	Dyeing and finishing technology	Printing and dyeing technology Printing and dyeing inspection	3
070800	Knitting process	Knitting and weft flat knitting technology Knitting and weft round knitting technology Warp knitting technology	3
070900	Clothing production and production management	Clothing CAD technology application Clothing documents and quality management Clothing material management Clothing production procedure management Clothing making	3
071000	Leather technology	Leather making Fur making technology	3
071100	Food Biotechnology	Food processing technology Food fermentation technology Food nutrition and inspection Food storage and marketing Food machinery use and maintenance	3
071200	National flavor food processing production	Dairy products processing technology Pastry processing technology Feature drinks brewing technology Meat processing technology	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
071300	Grain and Oil Feed Processing Technology	Grain processing and inspection Feed processing and marketing Oil extraction and inspection	3
071400	Grain and Oil Storage and Transportation Inspection Technology	Grain and oil storage and transportation and marketing Grain and oil inspection technology Feed nutrition and inspection	3
071500	Furniture design and production	Solid wood furniture design and production Plate furniture design and production Upholstered furniture design and production Furniture marketing and management	3
<i>08 Category of Traffic and Transportation</i>			
080100	Railway Transportation Management	Railway traffic organization Railway transportation passengers and freight service	3-4
080200	Application and Maintenance of Electric Locomotive	Electric Locomotive maintenance Electric Locomotive application	3-4
080300	Application and Maintenance of Diesel Locomotives	Diesel Locomotives maintenance Diesel Locomotives application	3-4
080400	Application and Maintenance of Railway Vehicles	Railway passengers transport Vehicles Application and Maintenance Railway freight transport Vehicles Application and Maintenance Railway train air-conditioning maintenance	3-4
080500	Electrified Railway Power Supply	Traction power supply operation and maintenance Overhead line system operation and maintenance	3-4
080600	Railway signal	Railway signal system operation Signal equipment installation, testing and maintenance	3-4
080700	Operation Management of Urban Rail Transit	Urban Rail Transit passenger and freight service Station management	3-4
080800	Vehicle Operation and Maintenance in Urban Rail Transit	Urban Rail Transit vehicle driving Urban Rail Transit vehicle maintenance	3-4

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
080900	Urban Rail Transit Power Supply	Transformer substation power supply operation and maintenance Overhead line system (lines) construction and maintenance	3-4
081000	Urban Rail Transit Signals	Urban Rail Transit Signals operation Maintenance of Urban Rail Transit Signals equipment	3-4
081100	Ship driving	Shipping management Shipping business	3-4
081200	Turbine Management	Ship mechanical equipment application and maintenance Ship electric equipment application and maintenance	3-4
081300	Ship sailor and mechanic		3-4
081400	Marine Electric Technology	Ship electric management Ship electric installation and testing	3-4
081500	Ship Communication and Navigation	Ship Communication and Navigation equipment application Electronic devices maintenance	3-4
081600	Outer tally	Container transport tally management Outer tally e-commerce management	3-4
081700	Ship Inspection		3-4
081800	Operation and Maintenance of Port Machinery		3-4
081900	Engineering diving	Underwater cutting and welding Underwater visual inspection Underwater salvage	3-4
082000	Waterway transportation management		3
082100	Civil aviation transportation		3-4
082200	Aircraft maintenance	Aircraft electromechanically maintenance Aircraft electronic maintenance Aircraft engine maintenance Aircraft structure maintenance	3-4
082300	airline services	Civil aviation security check Airport ground service Air crew	3-4
082400	Aviation fuel management		3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
082500	Automobile Operation and Maintenance	Automobile mechanical repair Automobile electrical appliance maintenance property inspection Automobile repair business reception	3-4
082600	Car body repair	Automobile metal plate work Automobile coating Accident motor vehicle loss assessment	3-4
082700	Automotive beauty and decorating	Car washing Car beauty Car decoration	3
082800	Automobile and accessories marketing	Car selling Second-hand car selling Car components selling Car insurance agent service	3-4
082900	Road Transport Management		3
083000	Highway Maintenance and Management		3
<i>09 Category of Information Technology</i>			
090100	Computer application	Office automation technology Computer professional typesetting Computer information management Computer equipment maintenance and marketing	3-4
090200	Application of Digital Media Technology	Digital cinematography Digital imaging and post-processing technology DV shooting and production Digital video and audio post production Computer music score and MIDI music production Ring back music and cell phone animation production Digital audiovisual equipment application and maintenance Sound mixing and editing technology	3-4
090300	Computer graphic design	Desktop typesetting technology Graphic and text information processing Graphic advertisement design and production Engineering effect design Digital photo aesthetic processing	3
090400	Computer animation and game production	Animation production Computer games production and operation Computer games programming	3-4

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
090500	Computer network Technology	Comprehensive wiring design and construction Network equipment installation and testing Wireless network testing and maintenance Web administration and maintenance Web products marketing Web and information security	3–4
090600	Website construction and management	Web design Web page design Web programming Websites construction and information security E-commerce website construction and operation	3
090700	Network security system installation and maintenance	Web and intelligent monitoring technology Management and maintenance of Intelligent building security protection and prevention system	3
090800	Software and Information Services	Software and information service subcontract Computer assisted design and charting Data base application and management Software products selling Software development and testing Web programming	3–4
090900	Customer Information Services	Call service Telephone operation and data processing Speed recording Information processing and analysis	3
091000	Computer speed record	Text information and data processing Meeting minutes service and management Data recording and processing	3
091100	Computer and digital product maintenance	Computer products marketing and maintenance Computer maintenance and repair Laptop maintenance and repair Digital products selling and maintenance Digital video equipment maintenance	3
091200	Electronics and Information Technology	Electronic measurement technology Security and protection system and monitoring technology Car electronic devices inspection and maintenance Aircraft electronic devices maintenance Ship electronic devices operation and maintenance	3–4
091300	Application of Electronic Technique	Digital audio-visual equipment application and maintenance Electronic products selling Electronic products production technology Optoelectronic products application and maintenance	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
091400	Digital Radio and Television Technology	Radio and Television broadcasting technology Cable television technology	3
091500	Communication Technology	Wireless communication technology Cable communication technology Application of new mobile communication technology Communication terminal technology Communication service	3-4
091600	Communications operations services	Communication marketing Communication value-added service	3
091700	Communication system engineering installation and maintenance	Communication network and equipment application Communication project installation	3-4
091800	Postal communication management	International postal service Postal transportation network Postal marketing Postal finance and accounting	3
<i>10 Category of Healthcare and Medicine</i>			
100100	Care	Child care Maternal and child care First aid care Oral care Rehabilitation care Mental Care Aged Care Foreign nursing	3-4
100200	Midwifery	Maternal and child health and care	3-4
100300	Rural medicine		3-4
100400	Nutrition and Health Care		3
100500	Rehabilitation technology	Physical therapy Sports therapy Occupational therapy Speech therapy Prosthesis and orthotics preparation Hearing screening Hearing-aid device application	3
100600	Optometry and Optics	Optometry refraction technology Spectacles Optometry technology Contact lenses optometry technology	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
100700	Medical Test Technique	Clinical inspection Health inspection Blood collection inspection Pathological technology	3
100800	Medical Imaging Technology		3
100900	Oral repair process		3
101000	Medical Biotechnology	Cell biotechnology Genetic molecules biotechnology Biochemistry technology Molecule immune biotechnology Experimental animal technology and management	3
101100	Pharmacy	Drug marketing Clinical operation procedures Drug logistics	3
101200	Traditional Chinese Nursing	The combination of traditional Chinese medicine and western medicine	3-4
101300	Traditional Chinese Medicine	Orthopedics and Traumatology of Traditional Chinese Medicine Acupuncture and massage	3-4
101400	Tibetan Medical and Tibetan Medicine	Traditional Tibetan medical Treatment Traditional Tibetan medicine	3-4
101500	Uyghur Medical Treatment and Medicine	Uyghur Medical Treatment Uyghur medicine	3-4
101600	Mongolian Medical Treatment and medicine	Mongolian Medical Treatment Mongolian medicine	3-4
101700	Traditional Chinese Medicine	Massage therapy Traditional Chinese medicine cosmetology	3
101800	Traditional Chinese herbs	Chinese Herb prescription and preparation Chinese Herb purchase and selling Chinese Herb plantation	3
101900	Chinese Traditional and Herbal Drugs	Chinese Herb prescription and preparation Development and production of Traditional Chinese medicine for health care	3
102000	Pharmaceutical Technology	Drug preparation Pharmaceutical manufacturing	3
102100	Biotechnology Pharmaceuticals	Pharmaceutical biotechnology Fermentation engineering technology	3-4

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
102200	Drug and food inspection	Drug quality inspection Health care drugs inspection Cosmetics inspection Food security inspection	3
102300	Medical equipment maintenance and marketing	Medical equipment marketing Medical equipment maintenance and after-sale service Medical electronic instruments marketing and maintenance	3
102400	Pharmaceutical equipment maintenance	Herb drug pharmaceutical equipment maintenance Maintenance for Chemical Pharmaceutical manufacturing equipment	3
102500	Family Planning and Reproductive Health Counseling	Reproductive health Counseling Family planning technology	3
102600	Population and Family Planning Management		3
102700	Health Information Management		3
102800	Medical and Health Accounting	Health financing and accounting Medical insurance accounting	3
<i>11 Category of Leisure and Health care</i>			
110100	Beauty and Body	Beauty Body care Manicure Hydrotherapy and aromatherapy Foot massage	3
110200	Hair and image design	Hair design Style design for movies and television	3
110300	Fitness body sculpting	Tai chi Yoga Pilates Aerobic Latin dance	3
110400	Leisure services	Billiards Golf	3
<i>12 Category of Commerce and Trade</i>			
120100	Accounting	Business accounting Financial accounting Government accounting Non-profit organization accounting Tax agency business	3-4

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
120200	Accounting computerization		3–4
120300	Statistics	Statistical information technology Statistics counseling service	3
120400	Finance	Banking Stock exchange transaction Investment	3–4
120500	Insurance business	Life insurance Property insurance Insurance products marketing Social security	3–4
120600	Trust business	Civil trust Business trust Charity trust	3–4
120700	Commodity management	Household appliances business Food business Medical products business Jewelry business Building materials and home furnishing business	3
120800	Monopoly goods business	Monopoly management Tobacco monopoly business	3
120900	Chain operation and management	Commodity chain operation and management Service chain operation and management Franchised operation and franchised system construction	3
121000	Marketing	Electronic products marketing Car marketing Cosmetics marketing	3–4
121100	E-commerce	Internet marketing e-commerce logistics Customer service management Business websites maintenance Websites promotion	3–4
121200	International Business	Foreign trade document Foreign trade inspection International Business agent service Foreign trade declaration assistant	3
121300	Business English		3
121400	Business Japanese		3
121500	Business German		3
121600	Business Korean		3
121700	Business Russian		3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
121800	Business French		3
121900	Logistics Service and Management	Storage and delivery Transport business Port logistics Delivery business Logistic client service Recycled products logistics	3-4
122000	Real Estate Marketing and Management	Real Estate Marketing and planning Real Estate developing and operation Property service and management Real Estate marketing and agency	3-4
122100	Customer service	Financial business customer service Recreational industry customer service Product after-sale customer service Tele-communication customer service	3
<i>13 Category of Tourism Service</i>			
130100	Hotel Service and Management	Lobby service and management Guestroom service and management Dining service and management Recreation service and management	3
130200	Tourism Service and Management	Tour guide in Travel agency Tour operation in travel agency Public communication in travel agency	3
130300	Tourism Foreign Language	English for tourism Japanese for tourism Korean for tourism Russian for tourism	3-4
130400	Guide service	Mandarin Chinese tour guide Foreign language tour guide Dialect tour guide	3
130500	Scenic Spot Service and Management	Tour guide for scenic spots Recreational tourism service Industrial and Agricultural tourism service	3
130600	Exhibition services and management	Exhibition marketing and planning Exhibition design	3
130700	Chinese cooking	Chinese cooking Chinese pastry making	3
130800	Western cooking	Western cooking Western pastry making	3
130900	Watch repair	Watch sales Locksets repair	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
<i>14 Category of Culture and Arts</i>			
140100	Social culture and art	Sociocultural music Sociocultural fine arts Sociocultural dance Sociocultural drama	3
140200	Radio and television program production	Interview editing Movie and television shooting Assistant producer and director	3
140300	Broadcasting and hosting	Broadcasting Cultural concierge	3
140400	Image and Television Technology	Photographic art Recording art Light design Cinematography Sound tuning	3
140500	Library and Information Management	Literature cataloguing and classification Book purchasing	3
140600	Publishing and distribution		3
140700	Cultural Relics Protection Technology	Cultural relics excavation Cultural relics restoration Framing	3
140800	Music	Vocal music performance Instrumental music performance Musical theory	3
140900	Dance performance	Chinese classic dance performance Ballet performance International Standard dance performance Modern dance performance Singing and dancing performance	3
141000	Opera performance	Kun opera Peking opera Huangmei opera Yue (Shaoxing) opera Yu(Henan) opera Ping (Hebei) opera Chuan (Sichuan) Opera	3
141100	Folk art performance	Story telling Cross talk Story-singing Standup comedy	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
141200	Theater performance	Drama performance Movie and television performance Musical performance	3
141300	Acrobatics and magic show	Acrobatics magic show Circus show	3
141400	Puppet and Shadow Play and Production	Puppet show Puppet making Shadow play Shadow play design and production	3
141500	Musical instrument building	Piano tuning Orchestral instrument repair	3
141600	Computer music production		3
141700	Animation game	Animation design and production Game design and production Game follow-up compiling and composition	3
141800	Web page art design	Web page art design and production Web page animation design and production	3
141900	Digital Imaging Technology	Digital movie and television artistic production Digital movie and television animation production Digital image collecting, restoration and editing	3
142000	Art and craft	Art and craft design and production Decoration design and production Products style design and production Indoor art design and production Home textile art design and production	3
142100	Art painting	Traditional Chinese painting Oil painting Sculpture Wall painting Lacquer painting	3
142200	Art design and production	Visual communication Art film and animation Multimedia design and production Exhibition art design and production	3
142300	Commodity painting production and management	Commodity painting production Commodity painting sales	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
142400	Clothing Design and Technology	Readymade garments design Clothing structure design and plating Dress handicraft production Sample making Fashion marketing	3
142500	Clothing display and etiquette	Fashion performance and display Fashion marketing Public relation and etiquette service	3
142600	Leather products modeling design	Leather fashion design and technique Dress shoes design and technique Leather ware design and technique Leather accessories design and technique	3
142700	Jewelry jade processing and marketing	Jade processing technique Jade sculpture technique Jade marketing	3
142800	Folk traditional crafts	Sculpture Embroidery Decoration	3
142900	Folk Music and Dance	Folk music performance Folk dance performance Folk song and dance performance	3
143000	The construction of national musical instruments		3
143100	National art	Folk printmaking Folk wall painting Thangka art of Tibet	3
143200	Folk clothing and apparel	Folk clothing production technology Folk hats and shoes production technology Folk garments and accessories production technology	3
143300	National embroidery	Tapestry knitting technique Prints knitting and dyeing technique Folk embroidery technique	3
143400	Decoration of ethnic dwellings	Decorative project construction and management Decorative project budgeting Architectural decorative project supervision and management	3
143500	Folk handicraft production	Carving and Sculpture Folk souvenir handicraft making Folk pottery Knife making technique	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
<i>15 Category of Sports and Fitness</i>			
150100	Sports Training	Specialized sports training	3
150200	Leisure Sports Service and Management	Yoga Comprehensive aerobics Fitness center service and management	3
150300	Sports facilities management and management	Sports facilities management Fitness center Bowling facilities maintenance and inspection	3
<i>16 Category of Education</i>			
160100	Pre-school education		3-4
<i>17 Category of Judicial Service</i>			
170100	legal Affairs	Administrative and legal affairs Assistant lawyer Assistant notary Civil business investigation Judicial secretary Judicial shorthand	3
170200	Community Legal Services	Judicial mediation Judicial assistant	3
170300	Security	Guard Escort Technical protection Special guard	3
<i>18 Category of Public Administration and Service</i>			
180100	Office clerk	Office automation Archives management Conference service	3
180200	Secretary	Business secretary Administrative secretary Conference and exhibition secretary	3
180300	Business Assistant	Public relations Business information announcement	3
180400	PR etiquette	Public relations service Image promotion design Brand activity design and implementation	3
180500	Administration of Industry and Commerce	Enterprise registration agent service Trademark registration agent service Contract management	3
180600	Human resources management services	Employment agencies Human resources agency service	3

(continued)

Table 4.7 (continued)

Specialty code	Specialty name	Specialized directions	Suggesting schooling period (year)
180700	Property Management	Community Property Management Office building Property Management Commercial building Property Management Venue Property Management	3
180800	Product quality supervision and inspection	Quality management Quality standard assessment Food and chemical products quality supervision and inspection Mechanical and electrical products quality supervision and inspection Construction project and building material quality supervision and inspection Pressure containers and facilities quality supervision and inspection	3
180900	Civil Service and Management	Non-governmental organization management Administrative division and geographical names management Social relief Election technology and its application	3
181000	Community public affairs management	Community service and management Community culture and Non-governmental organization management Social relief implementation	3
181100	Social security affairs	Social insurance Labor insurance Business insurance	3
181200	Social Welfare Administration	Child service Service for the disabled	3
181300	Home Service and Management	Home service management Foreign home service	3
181400	Elderly Service and Management	Community recovery	3
181500	Modern Technology and Management of Funeral	Funeral and interment social work Funeral and interment applied technology Funeral and interment unit operation and management	3

4.5 Administrative Document of Specialty Setup of Chinese Technical and Vocational Education

4.5.1 Administrative Measures of Specialty Setup of General Colleges, Higher Technical and Vocational Institutes

In order to advance the autonomous operation of general colleges in accordance with the laws, strengthen the macro-administration of the specialty setup of the higher technical and vocational education and stimulate the continuous and healthy development of higher technical and vocational education, these Measures are formulated in accordance with the Higher Education Law of the People's Republic of China and the Vocational Education Law of the People's Republic of China as well as the actual situation of the reform and development of Chinese higher technical and vocational education.

Catalog is a fundamental document to carry out the macro guidance of the higher technical and vocational education by the state, a guidance for the higher schools to set up and adjust the specialties, an important basis for the education administrative departments to carry out educational statistics and talents forecast and also an important reference for the social employing units to select and receive the graduates. The Ministry of Education carries out the administration of the Catalog based on the principle of immutable main specialty categories, relatively stable specialty categories and basically open specialties.

The specialties listed in the Catalog are classified, based on the classifying principle of vocational posts, industries and subjects according to the characteristics of higher technical and vocational education. It represents the combination of vocational and academic education and also gives attention to its connection to the undergraduate catalog. The specialty names adopt the method of "coexistence of wideness and narrowness." The connotation of the specialties represents the combination of universality and diversity. For the specialties with the same names, different institutes in different areas may have different emphasis and characteristics. Education administrative departments of all provinces and institutions of higher education should fully take advantage of the guidance of the Catalog during the management of specialty setup of higher technical and vocational education.

The Catalog has set up 19 main categories, namely agriculture/forestry/animal husbandry/fishery, traffic and transportation, biology/chemistry/pharmacy, resource development and plotting, materials and energy sources, civil engineering, water conservancy, manufacturing, electronic information, environmental protection/meteorology/security, light textile and food, finance and economics, healthcare and medicine, tourism, public utilities, culture and education, art/design/media, public security and law, and 99 secondary categories, totally 748 specialties. In order to embody the characteristic of the vocational education, the specialties of management category are temporarily and separately classified into different main categories.

All the provincial education administrative departments shall examine and ratify the specialty scope and the number of the newly-established specialties of the higher technical and vocational education by checking and evaluating the actual situation of the schooling conditions, qualities and benefits. In principle, schools may set up and adjust specialties in the approved specialty categories and mark the specialty orientation or connotative feature of the specialty in the form of “()” according to the specialty names in the Catalog. The specialties set up by the schools according to the law should be submitted to the local provincial education administrative department for recording. When the provincial education administrative departments guide the setup and adjustment of the specialties of the higher technical and vocational education, it should be noticed that: The specialty setup criterion and hearing system should be established to guarantee the scientific and standard specialty setup according to the related regulations; the state controlled specialties of medicine, public security and so on should be managed in accordance with the related state regulations; the specialty setup scope and number of yearly added specialties of the institutes should be linked to the evaluation of the institutes; for the specialties of higher technical and vocational education that have failed to reach the average employment rate of the province, the number of the recruited students should be reduced or restricted through the adjustment of the recruiting plan. Specialties of education category (category code: 6602) are commonly restricted to be set in normal institutes and academies.

Since 2004, all the provincial education administrative departments are asked to collect and sort out the recorded specialties of higher technical and vocational education and related materials, fill the Table of Specialty Setup of General Colleges and Higher Technical and Vocational Education and submit it to the Department of Higher Education of the Ministry of Education by the end of January of the next year. The Ministry of Education should summarize and publicize all the submitted information of the specialties so as to stimulate the communication of information and realize the resource sharing. For the newly-established specialties that are not contained in the Catalog, the provincial education administrative departments should make a corresponding specialty code based on the existing codes and mark the abbreviation of the province (such as “Ji”, “Lu”) after the code, for the use in the province. The Ministry of Education shall coordinate the submitted specialties that are not contained in the Catalog and update the Catalog every five years. With respect to the relatively common specialties that are not contained in the Catalog, the Ministry of Education shall make and publicize a formal specialty code based on the actual situation.

Institutes of higher education should be set up and adjust the specialties according to the requirements of economic development, scientific and technical advancement and industrial structure adjustment of China, sticking to the principle to meet the demand of frontline posts in manufacturing, construction, management and service industries, based on the teaching and training conditions of their own schools, and specially in accordance with the rules of economic development and change of vocational posts under the market economy system. At the same time, the institutes should abide by the rules of higher education and maintain the relative stability of education.

In order to firmly strengthen the macro management and guidance of specialty setup of the local higher technical and vocational education, all the provincial education administrative departments can lay down the Supplementary Regulations or Enforcement Regulations of the management of specialty setup of higher technical and vocational education in the province (autonomous region, municipality) according to the actual local situation and based on the spirit of these measures. The departments should make efforts to form a reasonable specialty structure and overall arrangement so as to stimulate the coordinated development of the scale, structure, quality and benefit of Chinese higher technical and vocational education.

The Measures are applicable for the independent higher technical and vocational institutes and the technical institutes affiliated to the undergraduate colleges and universities, and can also be used as a reference by the independent institutions of higher education for adults and institutions related to higher education.

4.5.2 Principles and Suggestions on Specialty Setup of Secondary Vocational Schools

The scientific and reasonable setup and adjustment of specialties are fundamental for the secondary technical and vocational education to serve the economy and the society, to realize the training objectives and carry out the teaching activities. In order to successfully implement the Specialty Catalog of Secondary Vocational Schools (hereafter referred to as the “Catalog”), and to stimulate the development of secondary technical and vocational education in accordance with the demand of Chinese economic and social development in early 21st century and further advance the teaching quality and operational benefit, the following principles and suggestions on the management of the specialty setup of secondary technical and vocational education are proposed.

4.5.2.1 Principles of Specialty Setup

The specialty setup and adjustment of secondary vocational schools should suit the demand of Chinese economic construction, scientific advancement and industrial structure adjustment as well as the demand for the high-quality laborers and secondary and elementary specialized talents on the frontline of manufacturing, service and technology in all the places and industries with overall quality of morality, intelligence, physique and art and comprehensive professional abilities.

The specialty setup and adjustment of secondary vocational schools should be favorable to the formation of a reasonable specialty structure, avoid the unnecessarily repetitive setup, enhance the utilization factor and the overall benefit of the professional educational resources, stimulate the characteristics of vocational schools,

advance the teaching quality and operational benefit and strengthen the vitality and attractiveness of vocational education.

The secondary vocational schools should meet the social demand and the demand caused by the change of occupations through the timely update of teaching contents, widening of professional scope and specialization of setup based on the actual demand. If it is necessary to establish new specialties, the schools should do so in accordance with the related regulations of these Suggestions.

The secondary vocational schools should set up the specialties in accordance with the setting criteria of related specialties formulated by the Ministry of Education and related industries, abide by the educational rules, have explicit training objectives, operation scope and main teaching contents as well as complete teaching programs and other necessary teaching documents. The schools should have the teaching staff for theory and practice that is necessary to complete the specialized teaching program and the funds, classrooms, laboratories, training sites, equipment, books and materials that are necessary for schooling.

4.5.2.2 Division of Responsibilities of Specialty Setup Management

The Ministry of Education is mainly responsible for the formulation of the management guidance policies of the specialty setup of secondary vocational schools in China and the constitution (emendation) of the specialty catalog, grasp the general situation of the specialty setup of all kinds of secondary vocational schools in China and carry out macro guidance.

The provincial, local governments and their educational departments are responsible for the macro coordination and management of the specialty structure of local secondary vocational schools and have the obligations to provide guidance and service consultation for the schools affiliated to the industries and departments which are set to serve the local area.

The related departments of the State Council are responsible for the management of the specialty setup of the schools directly under the departments and should provide the secondary vocational schools of the industry with the information service and guidance for the specialty setup and specialty structure adjustment.

The administrative departments of secondary vocational schools are responsible for the examination and approval of specialty setup and should help the schools to set up and adjust the specialties in time so as to serve the local economic construction and social development.

4.5.2.3 Examining and Approving Rights and Authorities of Specialty Setup

The setup of the specialties contained in the Catalog issued by the Ministry of Education for the secondary vocational schools should be examined by the department in

charge and approved by the provincial or local (municipal) education administrative department.

The recognized key vocational schools of the level of the province or above can independently set up the specialties contained in the Catalog according to the demand of local economic and social development and based on the corresponding standards of specialty setup.

To set up the specialization not listed in the Catalog, the school should carry out the argumentation, submit it to the departments in charge and shall not set it up until it is submitted to and approved by the provincial and local (municipal) education administrative departments.

To set up the specialties not listed in the Catalog, the school should carry out the argumentation and propose the application. The specialties shall be set up on trial after the examination of departments in charge and the approval of provincial education administrative department and should be reported to the Ministry of Education for recording.

When the schools directly under the related department of the State Council set up the specialties that are not contained in the Catalog, after having been approved by the related departments of the State Council, they should be reported to the Ministry of Education for Recording.

Chapter 5

Teaching in Technical and Vocational Education



Teaching, here, refers to all the activities designed for achieving the aim of teaching, which usually includes the process of teaching and learning. In technical and vocational colleges, teachers, first of all, have to direct students to master basic scientific and technological knowledge in a planned and purposeful way; then teachers are also expected to help students develop their creativity and practical ability; finally, teachers are required to help students form their correct worldview and values. Only by doing so, can the educational goal of technical and vocational education be achieved. In other words, in addition to imparting the basic knowledge, theory and skills of their specialty, teaching in technical and vocational school should aim at developing the practical talents of the students and to instilling in them good professional, moral and innovative spirit. In vocational education, teaching has a crucial role; it is teaching that will decide the quality of vocational education, and decide the direction of vocational education. Compared with other forms of education, technical and vocational education has its unique characteristics in many aspects such as teaching patterns, teaching methods and teaching organization as well. These characteristics are not only the basic requirements from our social economy but also the basic ingredients which make technical and vocational education different from other forms of education.

5.1 Teaching Modes of Technical and Vocational Education

5.1.1 A Brief Introduction

The teaching mode is a practicable and controllable structural process designed for achieving certain teaching goals on the basis of certain teaching theory, teaching principles and teaching experience. In other words, it refers to practicable teaching activities which work as the medium of teaching practice and teaching theory.

Teaching mode reflects characteristics of the teaching by teachers and the learning of students. Teaching mode consists of students' learning method and learning means. What teaching mode reflects is usually the teaching thought and idea of different schools, and philosophical and cultural view of education. With the further development of curriculum reform in technical and vocational education, teaching mode has become the focus of reform. Nowadays the "student-oriented and teacher-as-a-guide" approach has been introduced into the whole process of technical and vocational education; therefore teaching mode has become more and more diversified.

The features of teaching mode are the following: First, integrity. Each teaching mode has its own relatively complete structure and system and is usually composed of certain basic elements such as guiding principles, theme, goal, procedure, strategy, content and evaluation. The integration and recombination of the teaching system makes the structure of teaching seem to be complete. Secondly, uniqueness. Each teaching mode has its specific theme, certain goal, orderly progress and range of usage. Thirdly, briefness. The structure and operation system can be summarized and expressed briefly, symbolic image and clear sign. Fourthly, feasibility. The operation system of teaching, on the one hand, teaching mode is easily accepted because it mainly reveals rules of education from different angles and it is very near to our teaching practice. On the other hand, teaching mode is not theoretical, but mainly for application, so each teaching mode usually has a set of workable operation systems and procedures (Li 2008).¹ Fifthly, duplicability. In vocational and technical colleges, it is not realistic for all teachers to study the form and development of the teaching mode, but it is possible and unavoidable for them to learn, select and apply some proper teaching modes into their practice. In fact, what higher vocational and technical education lacks now is the so-called "case-guidance" medium. Duplicability is of vital importance in higher vocational and technical education.

Functions of teaching mode are mainly seen in the following two aspects: Theoretical and practical.

Theoretical function: First of all, teaching mode may bridge the gap between theory and practice. Teaching theory is abstract, while teaching practice is practical. They are so "far away" that the combination of all of them is very difficult. In this sense, teaching mode is much lower in theoretical level than pure theory, quite specific, brief, understandable and workable; meanwhile, it is much closer to theory than teaching experience is, very refining and systematic. Therefore, teaching mode can be the "bridge" in the communication and combination of theory and practice. Besides, teaching mode can provide rich resources for teaching theory. More than that, teaching mode is an important supplement to teaching theory.

Practical functions of teaching theory mode: First, teaching mode may help improve teachers' teaching quality; secondly, teaching mode may diversify teaching activity so that teaching can better meet and satisfy different teaching content, objects and setting.

¹Li Hui (2008). Practical Exploration on Teaching Modes of Combination of Working and Studying in Technical and Vocational Junior Colleges. *Vocational Technology* (2): 16–19.

5.1.2 Some Common Teaching Modes

5.1.2.1 “Broad-Base, Flexible-Module” Teaching Mode

“Broad base” means that in curriculum design, all general knowledge and skills of relevant professions should be included in the curriculum content. This design may help students acquire the basic skills needed for their future career. Students would more easily adapt themselves to different conditions even when they transfer to other fields. By “flexible module”, is meant, designing of professional content of learning according to the knowledge and skills needed for specific posts or professions. Training of this part of courses may reinforce students’ professional skills of certain positions and strengthen competitiveness in their professions. The teaching mode of “broad-based, flexible-module” in essence is specialized education on the basis of general education, to some degree; this mode can satisfy the requirements of market-driven education for “talent’s high mobility and strong adaptability”.

The teaching mode of “broad-base, flexible-module” has been widely applied in Chinese vocational and technical education. Take textile technology major as an example, there are so many different technical posts in textile industry, while students of this major can only have two years to finish their study under two-year higher vocational and technical education system. Accordingly, the curriculum structure of “specialized core curriculum + occupation-oriented curriculum + elective curriculum” is widely used. Core specialized curriculum and occupation-oriented curriculum are set according to various demands of professional tasks and ability. Thus the curriculum system is usually “not only broad but also flexible”.

First stage, “core curriculum”, is not aiming at any specific post, but at all basic knowledge and skills necessary for the textile industry. That is to say, the content of core curriculum related to the general ability for different posts in the textile industry. The form of core curriculum includes various integrated project-based courses, such as textile material, textile technology and equipment, fabric structure and design, weaving technology and equipment, practical training of textile technology foundation and some other compulsory courses for a textile major.

Second stage, “occupation-oriented” module: On the basis of core curriculum, in accordance with different tasks of different professions, “occupation-oriented” courses are developed to improve students’ adaptability to one or more positions. “Occupation-oriented” courses usually focus on the application of skills and development of students’ adaptability to different professions. For example, modules of technique application, product test, fabric design, business documentary letter and equipment maintenance are available to students. They can make their own choice according to their interest and strong points. During the teaching process, in order to strengthen students’ ability to fit in society and to compete with others, usually classified teaching is applied. Besides, from the point of view of employment, wide adaptability to different positions can satisfy enterprises’ demand for comprehensive talents. In this stage, every course aims at employment directly, focusing on the special training of knowledge and skills necessary for a certain professional position.

Meanwhile, the course also places emphasis on whether the course goal matches the requirements of knowledge and skills of a certain position or a group of similar positions. It would waste too much time to learn theoretical knowledge which is not so relevant. What is more, each module is a relatively small and closed program unit; schools can easily select some modules to meet the different demands for the development of local society, economy and technology² (Liu 2007).

5.1.2.2 Five-Stage Teaching Mode

“Five-stage teaching mode” is a set of relatively complete training modes, which suit the competency-based vocational and technical education under the condition of a socialism market-driven economy. Such mode uses some advanced vocational and technical teaching modes of foreign countries for reference. It also applies various modern scientific theories such as, pedagogy, psychology, educational technology, theory of curriculum design, marketing, technical economics and quality management. In accordance with the situation in China, this mode mainly focuses on the study of the following five aspects: Market survey and analysis, professional ability analysis, building of teaching environment, teaching practice, and teaching management and evaluation. This teaching can be carried out in five stages, because of its feature of periodic circular improving; it is sometimes called “five-stage, periodic and circular teaching mode”. The content and feature of each stage is as follows:

Stage 1: Stage of market survey and analysis. First, market survey means making a right decision on majors offered according to the study of the policies of our national and local governments and demands of personnel market; secondly, study the feasibility of offering some majors and then decide on the training mode and schooling system in accordance with the demand for talents.

Stage 2: Profession analysis. Having done the market survey and analysis, having determined the major offered, it is time to study the training goal. According to the competency-based principle of vocational and technical education, the analyzing method of professional abilities is applied to study the specialized professional skills and qualities of training objectives.

Stage 3: The building of teaching environment. The teaching environment includes hard and soft environment.

Stage 4: Teaching practice and management. The process of teaching practice includes four parts. First, proficiency test for freshmen; secondly, making study plans; thirdly, carrying out of plans; fourthly, evaluation and grading. During the process of teaching management, four points should be given special consideration. (1) According to the characteristics of vocational and technical education, departments of market, teaching development and evaluation, and employment counseling should be added to the school system. (2) The role of teachers has changed from purely giving students knowledge to managing learning activities, while students

²Liu Jingfa (2007). Preliminary Study on Formulating Two-Year Schooling System of Higher Education of the Textile Technology Profession. *Guangxi Light Industry* (11): 119–120.

turn from passive receivers to active learners. (3) All teaching facilities and appliances should be available for whenever teachers need them. (4) Establishing and perfecting the administration system of students' learning documents.

Stage 5: Teaching evaluation and reform. Teaching evaluation is a key connecting link in the cycle of vocational and technical education teaching mode. Therefore, teaching evaluation should be standardized, normalized and systemized to guarantee the smooth running of the teaching mode and for periodic improving. Teaching evaluation includes: Evaluation of students' training goal, evaluation of teaching environment, evaluation of teaching process, evaluation of teachers and evaluation of teaching.

The five-stage teaching mode is composed of market survey and analysis, establishing of training objectives, development of teaching resources, teaching practice and evaluation. These five stages form a large cycle, with every stage having its own small cycle. In other words, the five-stage teaching mode is actually a large periodic cycle. Under this large cycle, there are many small cycles. The previous stage cycle is the basis for the next stage cycle, while the next cycle can ensure the realization of the previous one. With the continuing movement of small cycles at each stage, the big cycle keeps moving upward, and as a result, the teaching level and quality improve as well. Additionally, this teaching mode specifically shows the leading role of trades, for example, in the aspects of the majors offered, development of teaching resources and teaching practice, this mode always emphasizes the reliance on enterprises, pursuit of the latest technological development, closeness to employment market. Professional competency analysis, development of teaching resources, teaching practice and evaluation are all for the development of students' abilities and education of students qualities. Therefore after graduation, students will have broad knowledge and relatively high professional competency; in the short run, they would be competitive in the employment market; in the long run, they may have strong potential for further development.

5.1.2.3 Behavior-Oriented Teaching Mode

The main line of behavior-oriented teaching mode is that teachers create a specific learning situation. The basis of this mode is in the task of the real or simulated professional area. Through the study of behavior-oriented professional courses, students acquire knowledge, develop skills and finally improve comprehensive professional abilities in the course of practice. It is composed of a series of teaching technologies, such as program teaching, case teaching, role-play, group discussion, simulated training and so on.

The behavior-oriented teaching mode started in Germany. It plays a very important role in developing the human's all-round qualities and comprehensive abilities. Increasingly, vocational and technical education experts around the world like to recommend this mode; China is no exception. The behavior-oriented teaching mode places students as the subject of the study; it is a student-centered teaching mode in a real sense. It focuses on the pursuit of knowledge and development of ability through

study. Students can not only adapt to the requirements of certain professional posts after study, but also apply this ability of constructing knowledge for other professions. In this mode, teachers play the leading role as the hosts, organizers and coordinators of the course. They create learning situations, give suggestion on learning form, and provide help and consultation for students' professional study³ (Li 2007).

5.1.2.4 Stratified Teaching Mode

“Stratified teaching mode” actually means students are divided into two types (one is for entering higher school, the other is for mastering of some professional skills and obtaining employment). They are called “class for further study” and “class for professional skills”, respectively. Different teaching organizations such as “working class” and “stratified teaching in one class” are adopted in the teaching of professional basic courses. Different curriculum goals, evaluation systems and step-by-step classified teaching are typical of this teaching mode. Students can finally get what they want and develop well together through this approach of with different emphasis.

In recent years, because the quality of students enrolled in vocational and technical education is not even; our classroom teaching sometimes neglects the need of some students, if the traditional teaching mode of treating everybody equally is still adopted. Therefore, the traditional classroom teaching mode should be stopped and the stratified teaching mode should be adopted. Our ancient educator and thinker Confucius said 2000 years ago that we should teach students according to their abilities and qualities with different teaching materials. Stratified teaching mode means that teachers would admit and respect these differences between students; carry out different and stratified teaching; the aim is to enable students to get the most suitable and best opportunities of study and to try and promote the comprehensive development of each student. On the basis of the same class system, students will be divided into different grades according to their levels when they enter school. On the basis of differences in knowledge, capabilities in the learning of various subjects, they would study in different classrooms and would have different developing targets and different teaching goals of subject at the beginning. According to the situation, stratified teaching mode introduces stratified learning, stratified target training and stratified evaluation. Stratified learning means students of different levels will receive knowledge according to a planned target system. Teachers only communicate to them knowledge that they can accept; stratified target training means that different assignments are given to students of different levels and students will receive stratified training; stratified evaluation means that according to different requirements on students of different levels, different test papers are designed for them. Because students' learning conditions are different in different subjects, they will be on different levels in different subjects. According to the rule that abilities can be transferred, success or improvement that a student gets from one subject will promote and drive

³Li Chun (2007). Practice and Thinking on How Behavior-Oriented Teaching Mode Optimize Classroom Teaching. *Health Vocational Education* (14): 70–72.

his/her their development in other subjects. As a result, their learning activities will be flowing, selective, self-designing and active. In stratified teaching, because students' capabilities and academic levels are similar, there will be fewer chances of complaints that teachers pay attention only to some students and are neglecting others. What is more, students of high level can learn more and better, students of moderate level can learn enough, while students of low level can understand what they are learning and teaching will become more efficient. In addition, this unique teaching mode will make every student experience fully the joy of learning and the pleasure of success. In this way, the students' personality will develop well and their passion for study will improve and the teachers can realize teaching goals effectively.

5.1.2.5 Theory and Practice-Integrated Teaching Mode

This mode means that in certain technical training centers, teachers and students achieve specific teaching goals and tasks by teaching, learning and practicing at the same time. Practice centers of vocational and technical colleges make the whole process of teaching similar to that of the technological development level of enterprises and develop the technologies together with enterprises. A conducive atmosphere is created in practice centers in order to promote the simultaneous development of ability and quality with hands-on experience of modern machines and teaching equipment combined with theoretical teaching, practical teaching, technological service and production. Because of its applicability, comprehensiveness, modern quality and simulation ability, this mode has helped the further development of vocational and technical education and has become an important means to develop a "double-quality" teaching staff.

The theory-and-practice-integrated teaching mode has been widely used in vocational and technical colleges. For example, Wuxi Machinery Manufacturing School made an investment of 6,000,000 yuan to establish the "NC technology center", "Modern electrical center" and "Automobile test center" in 1995 and through this effort, theory and practice integrated teaching has been realized there. Nanjing Electromechanical School established the MPS system of module packaged automatic processing, producing and assembling line and electrical and controlling technology center. The classical course at this school, "practical training of controlling system" is a good example of this teaching mode; it combines together the communication of theory, live demonstration and practical operation skill training. It takes multi-media, magnetic movable teaching facility, Internet, CAD software, dynamic simulation software; what is more, in the form of teaching, it includes two-way communication between teachers and students and team lectures as well; this course has achieved very good benefits in practice.

5.1.2.6 Two-Segment Allocation Teaching Mode

This mode tends to divide the period of the school system into two parts. In the first segment, public courses, professional and theoretical courses and teaching of professional skills would be taught. The combination of theory and practice would be enhanced. The focus of this segment would be the practical experiment, practice and practical training. The second segment would be the allocation teaching period, “career-oriented” professional training would be going on with the aid of instructors from colleges and enterprises. This mode is applied in many schools in various forms.

This mode focuses on specific posts and it can effectively shorten the adjusting time of graduates, besides, it can stimulate enterprises’ initiative to develop their own future talents with their own technological force and equipment. Furthermore, it does not put a heavy burden on enterprises, so enterprises can easily accept this mode and schools can adopt to it without much difficulty. This mode was adopted by Hubei Auto Industry College. The basic practice is as follows: Freshmen would turn to the study of basic theories after one month of military training, professional basic theories and major professional courses (including practice, experiment, and curriculum design, and so on). This segment would last three years and two months. The second segment is the allocation period, that is, according to the requirements of factories, combined with real situations, taking part in practice, operation and later a graduation project. This segment would last one year and ten months. During this period, in addition to production activities and practice, students have to take one to two professional courses and translate a certain amount of professional English material under the guidance of teachers from schools and factories. Students would be tested three times according to the requirement of the allocation period. Nanjing Mechanical Training College takes a flexible system of “2 + 1” mode, combining divergent selection allocation and two-segment allocation together. Under this mode, during the first two years, the curriculum is designed according to departments: Students of different majors of the same department would take the same basic courses and professional basic courses, so that students can broaden their horizon, strengthen their adaptability and self-learning ability. Developing technical skills and practical ability would be the purpose of this two-year curriculum design and large-scale project. The ultimate goal during this period is that students can meet the level of college students of a two-year system; in the last year, on the basis of allocation, schools will employ experienced and professional engineering technicians as part-time teachers, together with school teachers to guide students to finish the career-oriented training and graduation project design.

5.1.2.7 Modules of Employable Skill

Modules of Employable Skills (MES) is a teaching method based on careful analysis of every work post, task and skill. In this mode, the students are divided into some independent units strictly according to working standards, knowledge and skills the students should have. It is also called unit mode, module packaged technological

training. It means the combination of modules of different employment skills. MES is also called the “module packaged professional skills training mode”. This mode is built on the theoretical basis of system theory, information theory and control theory; it completely breaks the traditional teaching pattern, taking the module learning unit as the main line, reinforcing skills training through on the spot teaching. It is a relatively advanced vocational training mode. Nowadays, many vocational and technical schools in China have adopted this mode. The biggest benefit of using this mode is the convenience to add teaching units to meet the requirements of new posts. Therefore, it will better adapt to the frequent vocational changes in the society and will relieve the pressure of employment.

MES develops the comprehensive vocational skills necessary for each profession into modules by analysis of professions and tasks. Clear and definite aim is typical of MES; besides the general aim, each module has its own measurable learning aim. Learners will be aware of the goals after the study of each link; it will help to stimulate learners’ interest and initiative. Furthermore, MES contributes a lot to the development of the learners’ comprehensive professional skills and strengthens their employment abilities and future survivability. As reflected in the above features, this mode can be widely applied, not only in pre-vocational and technical education, but also in the post-employment adult education. It can not only be used in industry training, but also in tertiary industry training. In the staff education of enterprises, it can not only be used in post training, but also in job-transfer training or promotion training.

5.2 Teaching Methods of Technical and Vocational Education

5.2.1 A Brief Introduction

Teaching methods refer to the activities that teachers and students employ to finish specific teaching tasks in the course of learning. It includes the teaching method of teachers as well as the learning method of students under the guidance of teachers. It is a combination of teaching and learning methods. Teaching method is an important part of the whole process of learning. It plays a vital role in the teaching activity. To some degree, it will decide the success or failure of teaching activities and teaching efficiency.

The teaching method of Chinese vocational and technical education came into being in the long process of practice and exploration of vocational and technical education. It has its own traditions and features. To some degree, it suits the realistic situation of China. With the development of ideas and practice of vocational and technical education and the great changes taking place in the professional world, it is important to introduce suitable reforms in teaching methods.

Whether teaching goals and tasks can be successfully achieved or not depends mostly on the right choice of teaching methods. Teaching practice has proved that if teachers could not scientifically choose and reasonably use teaching methods, it would result in a waste of energy, place increasingly heavy burdens on students and result in a poor teaching effect. So in order to develop good talents, it is of great significance to correctly understand, choose and then use the right teaching methods. In order to successfully choose the right teaching methods, it is necessary to compare different methods, that is, to be aware of the range of usage, effect and application conditions of teaching methods. It is even more important to make clear the standard for the choice by studying teaching methods against the background of teaching theory from an overall view. Teaching is a kind of creative activity; there are rules to follow, but no fixed method of teaching. "There are rules to follow" means the adoption of any teaching method must first take into consideration the human's cognitive rule especially students' cognitive rule of different subjects and the requirements of certain teaching tasks and content. "There are no fixed method in teaching" means when choosing teaching methods, many factors should be considered carefully, such as reality, actual situations of the region, schools, teachers, students, equipment, and so on. Diversified styles for schools of teaching should be advocated but not a mechanical application of some style or one-mode system. It has proven in practice that any teaching method has its own strong points, but it does not mean it applies to all or is the only and the best method. In practice, different teaching methods should be used together. Therefore, the teaching method actually is a dynamic concept; it will change with the change of teaching activities, with the development of teaching activities and with the advance of science and technology.

Based on different elements of the teaching system and teaching process (aim, content, method, form, means and expectation of teaching), the following standards can be set for the choice of teaching methods.

First, teaching methods must be in accordance with teaching rules and principles. According to the principle of consciousness and enthusiasm of students under the guidance of teachers, it will be good to combine oral method, visual method and practical operation together in teaching and to put theory into practice.

Secondly, teaching methods should satisfy teaching aims and tasks, that is to say, when choosing teaching methods, we should consider its effects when it is used to settle a certain teaching task, and compare it with other methods. Only by doing so, can we avoid the stereotype of the teaching process. Besides, the teaching aims of vocational and technical colleges are to develop technical and applicable talents, so teaching methods should reflect its career-oriented principle. Career-oriented principle means teaching of all courses should follow career-oriented principle in all links including making practical skill developing plans, introducing teaching tasks and goals, carrying out practical teaching, evaluating teaching effects. Teaching staff needs to be well aware of the chosen major, the requirements and prospect of this major, and the features and requirements of all professional activities related to the major. This is not only the career-oriented requirement of vocational and technical education, but also the requirement of our socialism modernization building set on the talents of certain professions when faced with a new technology revolution.

Vocational and technical education should satisfy the range of knowledge that students need to study; it should also focus on broadening their horizon, cultivate their skills related to various professions and enable them to have the thinking pattern and practical abilities of their own system.

Thirdly, teaching methods should take into consideration the possibility of students' practical learning. This possibility may include possibility of age (physical or psychological), preparedness in nurture, education and development, and features of class teaching as well. Therefore, teaching and nurturing methods should vary from time to time in accordance with student's physical conditions, life experiences, skills, levels of knowledge and their abstract thinking abilities. For example, if students' academic level is high, it is proper to strengthen independent working ability or decrease the usage of visual method. On the contrary, if students' academic level is quite low, then it would be a good idea to use a conversation method and visual method more frequently and an independent working method less frequently. Sometimes, it is necessary to change methods accordingly, because using different combination of teaching methods would provide students with an advantage to acquire knowledge and would keep students' attention focused as well.

Fourthly, teaching methods must be in accordance with actual conditions and timeliness of teaching. Conditions here mentioned include material equipment conditions, health care conditions, moral conditions, aesthetic conditions and material of teaching method conditions in schools. Lack of the above conditions would limit the application of some teaching methods (such as visual, exploration or independent working methods).

Fifthly is upholding the principle of the combination of learning, research, production and training. It is this principle that reflects the features of vocational and technical education. This principle is an effective measure to promote further reform of vocational and technical education, explore the law of school running and improve teaching quality. It is also a new mechanism that closely combines school and society together that "closed" running system has become an "open" one. Teaching, training, production and research are an organic unity, they complement each other, they are inseparable, and none of them can be ignored. Among them, teaching is at the center, it can lay the theoretical basis and create the favorable conditions for production and research which can enrich the content of teaching and cultivate new methods for production. In turn, production then can pose new challenges on teaching and introduce new topics for research. Therefore, in the teaching process of vocational and technical education, the principle of combination of teaching, training, production and research should be carried out so that these four can come into effect as an organic unity.

Sixthly, teaching methods should suit the content of the subject. Teaching tasks can only be achieved through the teaching content.

Seventhly, teaching methods should suit the possibilities of teachers themselves; these possibilities include teachers' experiences, theoretical accumulation, actual preparedness, personality and so on⁴ (Du 2005).

In view of these standards for the choice of teaching methods, the relationship between theoretical teaching and practical teaching should be carefully defined in the process of teaching in vocational and technical colleges. Practical skills are necessary abilities for vocational and technical college students and also preconditions for employment. As a result, there is a tendency to emphasize the development of practical skills, neglecting communication of the theoretical knowledge. However, as we know, applicable talents of higher level must have a good command of theoretical knowledge. Otherwise, they would be unable to qualify for those high-tech and highly intelligent professional positions. So the relationship between the theoretical teaching and practical teaching should be dialectically and carefully treated. The emphasis of professional theoretical teaching should be its applicability, while the focus of teaching should reflect its practical nature. Students who have received vocational and technical education should be a new group of laborers capable of both physical work and mental work, who are aware of theories and are able to carry out practical operation. So, vocational and technical education should place emphasis on the teaching of basic theories. Only by doing so, can students master basic theoretical knowledge. Meanwhile, the guiding role of theoretical teaching of practice should not be neglected. Theories should be connected with practice and put into practice. It is that feature that decides the applicability of professional theoretical teaching. Additionally, vocational and technical education aims at developing some applicable talents who can engage in certain professions. So the main teaching purpose of vocational and technical education is to develop students' proficient professional skills and techniques. It should be admitted that basic theoretical education is very important and plays a guiding role. However, the students' practical abilities of operation are also of great importance. Practical teaching is a basic means for students' acquiring operational skills of their own majors and professional techniques. It is a basic form of teaching in vocational and technical colleges and the characteristic of vocational and technical colleges. Graduates of vocational and technical colleges will be employed after graduation. Whether they are competent or not in their future jobs and be accepted by society and employers will, to some degree, depend on how good their professional skills are, and on their own qualities and abilities as well. Hence, students' professional skills and abilities is an important symbol of evaluating the quality of vocational and technical education and a precondition for achieving economic and social benefits. Students of vocational and technical colleges should learn and master some practical operational skills, and should be capable of applying theoretical knowledge in analyzing and solving problems on the basis of cultural knowledge and professional theoretical knowledge⁵ (Dong 2006).

⁴Du Jize (2005). Study on Technical and Vocational Education under Socialism Market-driven Economy. Beijing: Economic Science Press: 241–259.

⁵Dong Buxue (2006). Higher Vocational Pedagogy. Nanchang: Jiangxi University Press: 51–52.

5.2.2 *Some Common Teaching Methods*

5.2.2.1 **Lecturing**

Lecturing is a teaching method in which teachers orally describe contexts, tell facts, define concepts, prove theories and analyze rules to students. The basic feature of lecturing is that teachers speak while students listen. Because language is a major means of communicating experiences and exchanging ideas, lecturing is the most widely adopted teaching method in China. The applications of other methods are mostly assisted by lecturing. Knowledge and skills that students need to learn mostly are from the experiences of predecessors, so students usually start with just accepting indirect experiences. The teaching content of vocational and technical colleges includes scientific and technological knowledge. This type of knowledge usually has some kind of concepts, theories and formulas. These highly abstract concepts, theories and formulas are beyond the direct experiences that it is necessary to rely on the aid of teachers or the description and narration in teaching materials to reproduce or reorganize the direct experiences that students have had. Only by doing so, can indirect experiences be connected with direct experiences, abstract concepts be connected with specific perception and then become the knowledge that students can understand. Students need to acquire a great deal of knowledge and techniques during the limited period of time, so they cannot explore all by themselves but need to rely on teachers' guidance. Teachers play a leading role in the teaching process; students have to acquire knowledge and techniques under the guidance of teachers. In the course of teaching, teachers are educators, students are being educated, and teachers are good at knowledge, well-trained and aware of how to direct students to study effectively. According to education goals, in a planned way teachers transform the known knowledge into each student's knowledge, in the meantime, develop students' intelligence and abilities, teach students about moral and cultivate students' personalities. With the help of teachers, students may acquire scientific knowledge in a relatively simple way and develop for the better. Therefore, in teaching, lecturing is a very important teaching method.

The lecturing method consists of three types: They are telling, explaining and speaking. Telling or narrating means that teachers describe the learning objects, introducing the learning materials and narrate how things come into being and develop. Usually telling or narrating is used to answer "what" questions. Explaining means that teachers systematically and rigorously explain and prove concepts, truths, rules and formulas to students; this is used to answer "why" questions. Telling and explaining have their respective focuses and are often combined together in application. Speaking means teachers deliver uninterrupted, reasonable and convincing analysis of a certain subject. Speaking is usually carried out in the form of an academic presentation; the audiences mainly are seniors of vocational and technical colleges.

Several points should be given special attention in the application of the lecturing method. First of all, the lecturing content should be scientific and ideological. All should be correct and instructive no matter what they are, narration of facts or

explanation or argument of concepts, formulas. What's more, teachers should learn to combine the scientific content and ideological content together and they should understand the teaching material and try to influence and educate students with their own understanding. Secondly, lecturing should be systematic and logical. That is to say, lecturing should be well-organized, with clear focuses, smooth and not too difficult or too easy. The focuses of lecturing should include major points of teaching material, students' difficulties and the internal logical relationship of teaching materials. The major points of teaching materials are actually the central content of materials. Students' difficulties refer to those points which they cannot easily understand or can easily misunderstand, and in most cases, the major points are students' difficulties. Thirdly, lecturing should be planned carefully. In order to finish the lecture within the fixed time, it should be carefully planned and flexibly carried out. Fourthly, in lecturing, heuristic teaching should be frequently used. Teachers should be good at raising questions, creating situations and stimulating curiosity. As a result, students can think actively and interact with teachers. Fifthly, teachers need to pay attention to their language. The language they use should be clear, accurate, brief, vivid, well-organized and understandable; gestures and body language can help students understand better. Sixthly, writing on the blackboard should be adopted properly in the process of lecturing. Blackboard writing usually consists of systematic writing and assistance writing. Systematic writing is mainly the brief content of teaching in the forms of argument type, clue type and graphic type. Assistance writing refers to the part of writing written on the two sides of a blackboard according to some temporary demands. Whatever forms, the following requirements should be followed: Brief and essential, enlightening and elaborate, neatly written and complete.

5.2.2.2 Case Teaching Method

The case teaching method means that when students have mastered some theoretical knowledge, teachers select some actual or possible typical cases and organize students to discuss and analyze and then give their own ideas about how to solve problems. Adoption of this teaching method may reinforce students' understanding of ideas, truths and ways in the teaching materials and improve students' abilities to analyze and solve problems and abilities to judge and reason, and may greatly stimulate students.

Basic requirements for the adoption of case teaching method include:

First, select and design cases carefully. Before classes, teachers should select one or more cases according to the teaching goals. The quality of cases will directly decide whether the teaching is successful or not, so teachers should give special attention to the collection and organization of teaching cases. Cases should be good in effect and can combine theories and facts closely together. Teaching cases can be collected by taking part in practice or be designed according to the teaching content with relative reference. At the same time, cases should be credible and typical. For example, through the anatomy of a sparrow, some relative theories could be made

easy. Cases must be systematic, through the study of cases, teaching efficiency will be improved, and students' logical thinking developed.

Secondly, organize case discussion carefully. Teachers should hand out cases to students beforehand in order to let them prepare on their own and discuss together. Students should be encouraged to be volunteers in the discussion. As to some difficult topics, teachers should take the leading role and try their best to encourage students' active participation in the discussion. Discussion may start with group discussion and then go into the form of class discussion or some other forms.

Thirdly, make detailed comment on cases. Before the end of case study, teachers need to conclude and comment on students' performance. Different ways of evaluation can be used: First, teachers conclude and comment on the spot; second, teachers will not make any comment at the moment and will let students go on with the discussion and comment on their performance only when students get their own answers; third, teachers will not conclude in the class, students are required to conclude their case study in the form of writing, and teachers would comment the next time. Whatever form it is, integrity will always be the special focus of case teaching⁶ (Du 2005).

5.2.2.3 Project Teaching Method

The project teaching method is actually a kind of teaching activity in which students and teachers are involved in a "project". "Project" refers to the task of producing a specific and useful product. It should have the following features: The operation process of this task can be applied in teaching content, theoretical knowledge and practical techniques can be combined together in this task; which has a direct relation to the actual production process and sales activity of enterprises; students can be provided with chances of working individually and arranging their own learning activity freely to some degree. In general, almost all products of technological production can be taken as projects, such as window (carpenter), steam engine (machining), alarm (electrotechnics), and so on; in business, finance and service industry fields, all tasks with the characteristic of integrity and having visible achievements can be a "project". For example, it could be goods presentation in the sales industry, advertisement design, software development in the computer profession and so on. In the teaching of vocational and technical colleges and polytechnic schools, curriculum design and graduation design are good examples of the project teaching method.

Secondary vocational schools and colleges are encouraged to work together with enterprises to complete the project. For example, in February 2012, the Ministry of Education signed an agreement with Shanghai General Motors Co. Ltd. about the cooperation between vocational schools and motor enterprises. The project involved the application of automobiles and vehicle maintenance and repair, 30 secondary

⁶Du Jize (2005). Study on Technical and Vocational Education under Socialism Market-driven Economy. Beijing: Economic Science Press: 241–259.

vocational schools participated in the project, which was completed successfully at the end of 2012.⁷

The project teaching method has the benefits of obvious practical nature, independency and subjectivity. It is a kind of specific practice of the combination of production and teaching, it has the following characteristics: Projects bring about the teaching materials and improve students' professional abilities; this method produces clear and specific presentations of achievement; students overcome on their own the difficulties and problems they meet with at work; this method is very challenging, as students are required to use the knowledge they have learned, learn new knowledge and techniques in a certain range and solve actual problems which they have never encountered before. When the project is finished, students and teachers should comment on the achievements and working and learning methods together.

Project teaching can be carried out according to the following five steps: Decide the target task; make a project plan; carry out the project; examine and evaluate; and file or apply the achievement. First, decide the target task. Usually teachers give one or more project tasks, and ask for students' suggestion or discuss with students together, and finally decide the aim and task of the project. Secondly, make a project plan. In general, under the guidance of teachers, students themselves decide their division and cooperation according to their conditions and then make a plan and make sure of the working process. Thirdly, carry out the project. Students carry out their actual practice according to the plan. Fourthly, examine and evaluate. When the project is finished, usually, students will first comment on it themselves, then teachers examine and evaluate the result of the project; it is also allowed that teachers and students discuss together, comment on the solution used in the working and characteristics of learning behavior. Fifthly, file or apply the result. Put the result of project application into production or in files. In carrying out the project, special attention should be given to: Combine the theory of certain teaching content together with the practical activity of the project; combine the theory of certain teaching content together with the producing process or business activities of enterprises; students should be encouraged to organize and plan their learning or working by themselves; the project should be of moderate difficulty, should be not only the application of learned knowledge and techniques, but also a process of using learned knowledge and techniques to solve practical problems that they have never come across in a certain range.

The project teaching method can be viewed as a teaching mode in the theory of constructivism. This method actually puts all new knowledge into one or more curriculum projects; students will generally know what knowledge the project would involve and find out among themselves what is new and what is old by a series of surveys and analysis, experiments and classroom discussion on the project; and finally, with the help of teachers, students will find solutions to the problems and finish the real construction of the knowledge learned when they accomplish the project. In fact, this process is not simply receiving knowledge and finishing a study, but rather an approach attempt in which students learn how to study.

⁷China Education Yearbook (2013): 225.

In the process of carrying out the project, group members take part in all activities together and discuss together. Cooperation is required from division of the project, choice of plan, collection of information, accomplishment of the target, test of experiments, presentation and evaluation of results. In the process of cooperation with one another, problems are settled. Evaluation among groups can promote students initiative to make efforts for the success of their own group. Through group cooperation, students feel the power and intelligence of a collective, understand the importance of teamwork and of course develop their abilities in this respect. This kind of evaluation improves and strengthens students' various abilities.

5.2.2.4 Experimental Teaching Method

The experimental teaching method is about students carrying out some practice independently under the guidance of teachers, with certain equipment, instruments and materials. The experimental teaching method is very important and frequently adopted in vocational and technical schools; it has been widely used in the teaching of basic courses and professional courses of vocational and technical schools. The major features of this method are that students operate on their own, and change the conditions purposefully. The purpose is not only to test book knowledge, but also to develop students' abilities to make proper use of instruments and equipment, abilities to test, adjust, analyze, integrate and design experiment plans, and develop their abilities to write experiment reports. It also contributes a lot to the development of students' intelligence and some psychological qualities because in the process of experiments, keen observation, persistent attention and abstract logical thinking are necessary. What is more, seriousness, patience and quality of seeking truth from facts are essential. Through experimental teaching, students will be made to combine some personal knowledge with book knowledge so that they may relatively have complete knowledge. This method can also be used to test and strengthen basic theories, teach students to use instruments and tools, train students' observation, test, calculation, data processing and phenomenon analysis. It also helps to develop the students' abilities to work independently and to perform experiments; it can also let students master scientific ways, make students more interested in exploration, improve their research abilities and develop their scientific attitude and spirit of seeking facts.

Experimental teaching is not only connected with theoretical teaching, but also has a close connection with some other types of practice teaching. For example, some experimental teaching is connected with internship teaching, students carry out the dismounting of mechanical machines in labs. So this type of experimental teaching is also called internship teaching in labs. There are some curriculum designs and graduation designs which need further tests through experiments to examine whether designs are reasonable or not.

Types of experimental teaching method as follows:

First, demonstration experiments, this refers to teachers doing experiments in labs or classrooms in order to demonstrate to students; students themselves will not participate. This demonstration experiment is usually used in the teaching of

theories, which can impress students visually and help their understanding of the new theory. Sometimes this method is used to show students how to carry out an experiment correctly, illustrate the items that they need to pay attention to, usually as a demonstration for beginners.

Secondly, basic training experiments, experiment content is always about the correct use of common instruments, meters, tools and equipment. In experiments, teachers will start with the introduction of the structure, usage and function of some instrument, tool or equipment; then they go on to introduce how to use them correctly and some let students operate and note down the results of operation. For example, how to correctly use an analytical balance—students will be organized to weigh objects of different weight ranges; how to use multi-meter—students will have to measure voltages, current and resistance of AC and DC ranges, and so on.

Thirdly, general experiments, it refers to the guidance of teachers; students do experiments that teachers have planned and made specific regulations in advance. The regulations may include: What instruments and equipment can be used; how the experiments go on; how to test the results of experiments and so on. This type of experiments will follow the basic training experiments and will be arranged in the order from something easy to difficult, simple to complicated, so that students' experimental skills and abilities can be improved step by step.

Fourthly, comprehensive experiments, this refers to large scale experiments, which involves knowledge of different courses; various equipment are adopted, such as function tests of complicated machines or equipment, examinations or tests of a certain designing project.

Fifthly, experiments of designing type, this refers to teachers asking students to do experiments, The students select instruments and equipment, make experiments plan, conduct them, and analyze the results by themselves. The teachers finally comment on the performance. This type of experiments is a vital link for developing and forming students' experimental abilities after they have finished the previous types of experiments⁸ (Dong 2006).

Several aspects should be given special attention in experiments: First of all, good preparation. Teachers should carry out experiments in advance, examine and check all instruments, equipment and materials carefully to ensure the correctness, standard, effect and security. Teachers should prepare instructions according to teaching outlines, draw out experiment projects and divide groups according to conditions of instruments and equipment. Before the experiments, students are asked to read the instructions carefully; make clear the aims, requirements and theories of experiments; how to fix and use instruments and equipment and procedures of experiments. When it is necessary, teachers should make demonstrations. Then, in the process, teachers should move around and give instructions. They should stimulate and direct students, and try to develop students' individual operations and spirit of independent exploration. What is more, they should teach students how to observe, test and record results, how to analyze the process and results, and to master the necessary

⁸Dong Buxue (2006). Study on Higher Technical and Vocational education. Nanchang: Jiangxi College Publishing House: 112–115.

data processing methods. It is most important that teachers should encourage students to perform by themselves, find and correct mistakes immediately. Finally, after the experiments, both students and teachers should conclude and comment while the students write the experiment reports. Teachers should have a definite comment on the reports.

5.2.2.5 Simulated Practical Training Method

The simulated practical training method, also called simulated training method, refers to students, under the direction of teachers, playing some real professional roles under a simulated working environment. They engage in some operational skills training and a series of activities related to some professions. In some majors of vocational and technical schools, because of their special qualities, students hardly get any opportunities in enterprises to have post practice. As a result, they need the comprehensive practice in the simulated environment of schools so that they can improve their actual working abilities and strengthen their adaptability in post working. For example, students can practice in “simulated reception service practicing room”, “simulated restaurants”, “simulated guest rooms” of tourism major, “financial accounting simulated practicing room” of financial accounting major. Through simulated practice, students may learn something about their “posts” in advance, learn how to apply the knowledge they’ve learned and be aware of professional requirements. This kind of practice can inspire students’ passion for learning, arouse their interests and confidence and strengthen their abilities to discover, analyze and solve problems. It can also help to develop students’ abilities to contact, communicate and cooperate with others and can contribute a lot to students’ adaptabilities in society to seek solutions to problems, strengthen students’ consciousness of participation and their subject position. What is more, through the practice, a lot of valuable and rare materials and equipment are saved and security can be guaranteed because dangers and bad results can be avoided in practice. As a result, loss caused by operational errors can be reduced.

According to teaching requirements, simulation has the following types: First, simulation of machines and objects, such as simulated automobiles and trains and simulation of flying a plane, simulation of clinical diagnose and emergency salvage as well as simulation of computers. Secondly, environment simulation, such as simulated power plant, telephone office, court, ward, enterprises, financial department and simulated store, guest rooms, restaurant and so on. Thirdly is character simulation such as simulated judge, accountant and simulated waiter, salesman, actor and so on. Simulation can be carried out in three forms: Individual technique training, comprehensive technique training and practical ability training. It can go on in a traditional way or be presented with modern teaching media, in simulated teaching, teachers work as directors, one or more students work as actors; they play some specific roles, other students will be the audience or listeners.

In the teaching at vocational and technical colleges, simulated company is a very important form of this teaching method. Simulated company means that teachers

purposefully create a kind of simulated environment of business activity. It is usually the teaching and practicing place and organization form of economy and business majors. Students can experience the whole operation process of a deal in this company, learn and fully understand make clear the relation between different links and they needn't take any financial risks. According to the different orientations of products and service projects, students may engage in marketing, financial business, finance, storage and transportation, tax, customs, insurance, stock, and some other simulation of the operation process. In simulation, every step including bills, account book, operation process, calculations is carried out and designed according to real activities.

The professional situation from the real world would arouse students' curiosity to learn. The production practice is a kind of important practical teaching for vocational and technical colleges. Students will be sent to a practice workshop by the schools (farm, supermarket, hospital, hotel, and so on) or go to production sites out of the schools and they will have a chance to practice the various types of practical work. Students are required to master the operational techniques comprehensively of their majors, reach a certain level on proficiency, master modern techniques and equipment use, and ensure the quality of products and ensure that the produce is safe and orderly. Practice in schools cannot make students achieve these goals in all aspects; as a result, practice in and out of schools is combined together. In teaching, it is the most economical and efficient way to make full use of these two bases of practice.

The application of the simulated teaching method should follow the following requirements: First of all, it is necessary to establish a good simulated teaching environment. It is also the key to the application. Setting simulated teaching classrooms according to the characteristics, teaching content and requirement of majors is a must. The simulated environment must be very close to the real situation so that students may get in their roles once they enter the classrooms. Furthermore teachers should tell students the content and requirements of the practice clearly and make demonstrations. Thirdly, in simulated practice, teachers should be hard on students and correct problems so as to improve the effect of the practice. Teachers need to direct students to work seriously, to master professional skills well through role-plays. Setting barriers of moderate difficulty and asking students to clear them will strengthen their abilities to solve complicated problems. Teachers should make sure who are responsible for the problems in the practice so that they can be helped to develop their sense of responsibility and professional problems arising from the practice should be corrected immediately and lessons learned from them should be discussed and understood by the students. Fourthly, it is required to draw a careful and detailed conclusion. After the practice, teachers should make a summary of students' performance, point out problems and give marks to each student according to scoring standards and encourage students to keep going in order to achieve the expected goals.

5.3 Teaching Organization Forms of Technical and Vocational Education

5.3.1 A Brief Introduction

Vocational and technical education has various forms of teaching organization. The form is decided by the content and is a means of making teaching content come true and realize the ultimate teaching goals. The teaching content will decide the form of the teaching organization; the form serves the content. Because of the influence of the teaching stereotype, restriction of teaching quality and limits of teaching environment, our vocational and technical education still has a long way to go in respect to stimulating students' initiative, especially in the aspect of reforms of the form and method of student-oriented teaching organization.

The teaching organization form of vocational and technical higher education refers to the combination of all basic elements comprising theoretical teaching and practical teaching in order to achieve teaching goals and help students obtain the knowledge, abilities and professional attitudes that are essential for the various professional posts. Teaching activities must be realized in some form of organization. Elements of different forms of organization change frequently; as a result, the form of teaching organization has to change accordingly. Obviously, studying how to apply teaching organization form is of great significance to put the already allotted teaching content into practice, to realize teaching goals as planned and to improve teaching quality.

Features of vocational and technical education make it necessary to put the emphasis of teaching on the application aspect of knowledge (strengthen students' transformation abilities in knowledge). So forms of teaching organization should have the following characteristics:

First, the teaching space must be wide. The locations for teaching activities of vocational and technical education should be wider than those meant for general education. The places for vocational and technical teaching activities should satisfy the requirements of practical training activities (such as electrical labs for electricians, simulated labs for computerized accounting, practice workshops, factories, hotels, restaurants even experimental farmland) as well as the requirements of general teaching activities, in order to promote professionalism in the students. Therefore, vocational and technical colleges should take various forms such as a combination of schools and enterprises to make education open to society, to exploit social potential, to make full use of all positive elements and to make an effort to build all kinds of necessary laboratory practice training bases.

Secondly, teaching time should be flexible. The timetable of general education just needs to fit in with the rules of students' physical and psychological development. For instance, in primary schools, one class period is 40 min, in high schools, it is 45 min, and in colleges it is 50 min. Teaching activities of vocational and technical education should adapt to the requirements of professional activities, besides the common rules. The length of teaching activities should change according to whether students are organized to practice on the spot or to take part in some social activities.

For example, in the case of a nursing major, one period of practical teaching is usually 30 min, while majors in restaurant and tourism law, the time for practical teaching is even more flexible. Vocational and technical education should set different time spans according to the different requirements of professional posts and features of the various majors. There should be enough flexibility to accommodate the different majors.

Thirdly, the teaching staff should play different roles. In general education, participants of teaching activities usually play only one part, while educators of vocational and technical education have, first of all, to take the teachers' tasks in common, besides, having to master professional skills. This means that they are usually double-quality teachers. But in fact, roles of teachers have become diversified, that is to say, teaching staff in vocational and technical education, whether they are theoretical teachers, or directors of practice, or masters, or trainers of professional training, or technique trainers, they share different but inseparable theoretical and practical teaching tasks; they must provide a reliable guarantee for the realization of developing the goals of vocational and technical education. The flexibility and proper adoption of forms of teaching organization in vocational and technical education not only helps to improve the efficiency of teaching activities, but also makes it possible to apply different teaching methods and means into relevant forms of teaching organization⁹ (Zhao 2001).

5.3.2 Some Common Forms of Teaching Organization

5.3.2.1 Alternation of Learning and Working

Alternation of learning and working or cooperation of colleges and enterprises is a teaching organization form in which schools and enterprises make plans for developing talents together, practical training and school learning are carried out together, and learning and working are connected closely. In this form, "learning" in fact includes the learning of basic and professional knowledge, technologies and techniques in schools and learning of technical and practical courses in enterprises. "working" implies that students will get paid when they work in enterprises as their staff during the period of practice. In order to realize the developing goals of higher vocational and technical education and to satisfy the requirements of advanced practical personnel, the form of alternation of learning and working follow the cognitive rules of "practice-theory-practice again", realize the close combination and interaction of theories and science, and improve continually students' understanding of knowledge and abilities to apply knowledge into practice through repeated "practice-theory" process and to move forward further.

⁹Zhao Zhe (2001). Teaching Organization and Methods of Higher Technical and Vocational Education. China Higher Education Research (4): 51–53.

The alternation of learning and working is usually carried out like this: Enterprises and schools make talent the developing plans, teaching plans and tips on carrying out together before freshmen enter college; after students arrive, they will receive basic theoretical teaching and practical training in schools; then they will be sent to enterprises to practice on posts after further study of professional knowledge, technologies and techniques during the working term. The time span is usually two to four months; after the working term, they will go back to school to engage in comprehensive learning; finally they will take part in an employment practice.

The alternation of learning and working has the following features: First, technical training will last through the whole process of talent developing; this training will be continual. Secondly, theoretical teaching and practical teaching are arranged in turn, focus of this arrangement is the interaction between theory and practice and the coordination between them. Thirdly, new knowledge will be absorbed into teaching content and knowledge of different subjects will influence each other. Fourthly, participation of enterprises in the teaching process really makes it possible to combine schools and enterprises, producing and learning together.

The alternation of learning and working completely breaks the traditional mode of first learning theoretical knowledge, then taking part in practice in enterprises and finally testing theories in practice. It especially emphasizes the influence of practice on the students' learning career. A certain amount of practical teaching is added when theoretical teaching is going on, and similarly, a certain amount of theoretical teaching is added when practical teaching is going on. In the process, the two types will be effectively connected together so that disadvantages of each can be avoided. Enterprises take part in the whole process as the designers and operators of this mode. Students are staff of enterprises when they are practicing in them; as a member of the enterprise, each of them should follow the regulations of the enterprises. In the meantime, the alternation of learning and working organically connect enterprises with schools through the process of developing talents, teaching locations of teachers and learning locations of students extend from schools to enterprises, which are not only working places for students, but also learning places. Students are not only learners of techniques in enterprises, they are students here, but also users of certain technologies and techniques; they are staff. So the teaching space of schools and learning space of students are broadened. Students will be influenced by the culture and spirit of the enterprises; it will be very helpful to the improvement of students' professional qualities.

Because the alternation of learning and working especially emphasizes the effect of practice on students' learning, students will learn on their posts in enterprises for quite a long time; technical requirements of posts are also quite high. This mode will be hard on the selection of technologies of enterprises and will better fit in with those majors whose requirements of professional knowledge and techniques are high and students need relatively long periods of time to master the techniques in practice. As a result, this mode will be particularly applicable to engineering majors of higher vocational and technical education.

The successful application of the alternation of working and learning rely on certain conditions. First of all, schools should emancipate the minds of students, open

themselves to the society, take enterprises as their partners, and place emphasis on students practicing and working on posts with the “multi-win” view; secondly, students should, together with their families, participate actively in social power, and family resources should make full use to arrange the right posts for students of different majors. Besides these, schools should stimulate the initiatives of enterprises, with the development of technological level of production. New staff enrolled by enterprises usually have to be trained for quite a long time before they can be really qualified for the posts, so enterprises need those staff who were familiar with requirements of posts and can work on posts immediately without any further training. It can be realized only when enterprises participate in the process of cultivation of talents in schools.

In the practice of our Chinese vocational and technical education, there are so many schools that have adopted the alternation of learning and working because it is very flexible in application. For example, Changzhou Institute of Industrial Technology adopts the “3 + 1” mode. When the length of schooling is the same, one-year period of novitiate is taken into the teaching plans so that all links of teaching can be arranged according to the requirements. Theoretical and practical teaching should be going on in turn and moving forward. The three-year schooling period will be finished in four years’ time. Students will go directly to their working posts. Benxi Junior college of Metallurgy adopts the “2121” mode. The first and second semester students will receive theoretical teaching in school and go to enterprises to participate in engineering practice in the third semester. Then they go back to school to receive further theoretical education during the fourth and fifth semester; in the sixth semester, they go back to enterprises to carry out their graduation practice.

5.3.2.2 Work-Study Program

The work-study program means that students study and work with pay while they are still in schools. Usually working posts are closely related to their majors; students study in schools for half a day and work in enterprises for the rest of the day, students and enterprises can benefit a lot from this program. Enterprises would benefit because majors offered by schools are full of vitality and students become capable. This program embodies the “human-oriented and overall development” educational idea; school education changes from the closed form to a kind of open-to-society form, which makes students move from classrooms of schools into practical posts in enterprises; education changes from being subject-based and degree-based into professional and competency-based, and from theoretical education-centered to practical process-centered; changes from subject-orientation into student-orientation. In a word, it is a good form for cultivation of talents with characteristics of vocational and technical education. The work-study program started from part-work and part-study system in order to pay for part of the tuition and life expenses of students from poor families, but the main purpose is to strengthen working education. It is evident that establishing and improving the work-study program will be of great significance to the fulfillment of the Party’s policies and will help students from poor families to

receive vocational and technical education at a low price or even free of charge. It is also of great significance to the development of vocational and technical education, and the cultivation of high-quality laborers for the society.

Under the existing situation of education in China, several points should be given special attention when putting forward the reforms of work-study programs as a form of teaching organization: First, stick to the education of students. “Work” serves “study”, but this service mainly means that schools and enterprises should keep educating students through working posts, influence and educate students through a culture of enterprises. Secondly, it is necessary to exploit rules of education. For instance, rules on how to link up the profession, course, teaching material and teaching between “work” and “study”, managing rules when students work also needs careful study and exploration. Thirdly, it is essential to perfect the policy environment, including security guarantee, students’ rights, and enterprises’ rights and so on. Besides, when experiments of work-study programs are carried out, it should be emphasized that work-study programs should be set up on a platform of cooperation between schools and enterprises. Cooperation between schools and enterprises belongs to the category of reforms of school-running models of vocational and technical education, while work-study programs belong to the category of reforms of talent cultivation modes. Without the basis of cooperation between schools and enterprises, it is impossible to put forward the reforms of talent cultivation modes such as work-study programs. In the work-study program, “work” and “study” should be connected closely; it should not be turned into mere part-work and part-study. According to the requirement of cultivation goals of majors, school students should be organized to go to employing units to carry out their teaching practice and working on posts, enterprises should also take part in the setting up of talent cultivation plans of majors on experiments. Schools should set up certain teaching contents and cultivation type accordingly, study how to evaluate teaching quality and assess students, establish the instructor system, organize constructive activities of Youth Leagues, strengthen students’ political and ideological education and professional morals and improve students’ comprehensive qualities.

5.4 Characteristics of Teaching of Technical and Vocational Education

5.4.1 Clear Vocation-Orientation

Vocational and technical education is a kind of professional education whose aim is to develop professional talents in certain technical or vocational fields. Teaching plans should be set according to the cultivation goals. Its curriculum design, choice of teaching materials and content of activities should be directly or indirectly related to the cultivation goals so that professional talents cultivated have proper knowledge

structure and ability structure and they can successfully transfer from learning in school to working independently in professional fields.

The types and standards of talents that different types of education develop are completely different. They usually have a different structure of knowledge and abilities. What general education tries to communicate is just common cultural and scientific knowledge and basic skills of reading, writing and calculating. The structure of knowledge and abilities of vocational and technical education is different from that of general education; and the focus is also different. The process of knowledge communication in vocational and technical schools emphasizes its technology and applicability in content, while knowledge transmission in general schools usually concentrates on the nature of the subject and theory, and it is usually systematic. In vocational and technical schools, the teaching techniques are usually organized on the basis of the improvement and development of professional abilities while general schools focus on the orientation of systematic knowledge and develop students' theoretical thinking patterns and theoretical creativity.

In order to meet the requirements of developing professional abilities, vocational and technical schools adopt some unique teaching methods, for instance, the teaching content of module teaching mode, professional skills-oriented modules of theories and practical skills may adapt to frequently changing requirements of professional skills of different posts; teaching and practicing bases of schools may satisfy the demand for training and practicing of professional skills and techniques. The evaluation mode of combining academic certificates and certificates of technological grade can reflect the characteristics that in vocational and technical schools, both knowledge and technique are important¹⁰ (Liu 2004).

5.4.2 Behavior-Oriented Teaching Process

Behavior-oriented teaching usually aims at the development of students' self-judgment abilities to make them acquainted with professions and build up the sense of responsibility. Behavior-oriented teaching puts the development of individual's behavior first. This usually includes the individual student's professional ability, social ability, moral and thinking ability; the ultimate goal is to enable students to learn to study, learn to do, and learn to be.

Behavior-oriented teaching usually shows the feature of two-way interaction. In the course of behavior-oriented teaching, teaching goals can be realized in many forms. Project teaching method means that during the process of realizing some teaching goals, students complete a task by creating the idea of this project, putting forward their own project plans, formulating project procedures and carrying out plans. This simulated practical training method puts students in simulated offices or factories so that students get the feeling of self-participation. This form may give

¹⁰Liu Hequn (2004). Vocational Pedagogy. Guangzhou: Guangdong Higher Education Press: 142–154.

students more opportunities and make the evaluation of students more objective. The case teaching method is also an effective way of professional education. It can help students improve their abilities to analyze and solve problems and may perfectly deal with the possible problems in future jobs. The ultimate goal of behavior-oriented teaching is to develop some of students' important abilities: One is the ability related to individuals; the second is social ability and organizing ability. The ability related to individuals refers to curiosity and creativity, self-innovation and independence, learning ability, responsibility, ability of endurance, quick reaction to emergencies and the ability to take risks; social ability and organizing ability refers to communication ability, application ability, analyzing ability and organizing ability. Important abilities are vital in all professional areas, but they have no direct relation to any specific productive or business activities¹¹ (Wu 2007).

5.4.3 *Integration of Theory and Practice*

The general cognitive process of human beings is from practice to cognition, from perceptual cognition to rational cognition. Lenin concluded that this process starts “from perceptual cognition and proactively develop into rational cognition, and proactively direct revolutionary practice from rational cognition” and this is the process of “practice, understand, practice again, then understand”. The cognition process of students, overall, has to be based on perceptual cognition through some practice; meanwhile, theories learned by students in turn have to be tested and directed by practice, this is called “study for the sake of application”. So, the teaching process should follow the general rules of the cognition process.

The ultimate aim of vocational and technical education is to develop talents equipped with both theoretical knowledge and practical abilities, which are popular in enterprises. It is when graduates learned skills are popular in the employment market that vocational and technical education can be full of vitality. Strengthening the combination between theoretical education and practical education is the most important feature and the essential part in the reform of teaching content and teaching mode in vocational and technical education¹² (Dong 2006).

Teaching in vocational and technical education should adapt to the demands of complex posts and applications of the highest and latest technologies and give special attention to the development of comprehensive abilities in the aspect of developing professional skills and professional abilities. Students need, first, to improve their professional qualities, pay attention to intelligent techniques and specialized abilities and master one or more “technologies” or “techniques” so that they can become “skillful craftsmen”; then students have to strengthen the development of compre-

¹¹Wu Xueping (2007). Basis and Application-Study on the Policy of Higher Vocational Education. Hangzhou: Zhejiang Education Press, Hangzhou: 34–201.

¹²Dong Buxue (2006). Study on Higher Technical and Vocational education. Nanchang: Jiangxi College Publishing House: 112–115.

hensive abilities so that they may have their specialty and deal with theoretical and practical problems arising from their actual work on the basis of the combination of theories and practice. The above features of vocational and technical education make vocational schools pose high requirements on practical teaching, including the following aspects: First, the form of practical teaching should be diverse. Practical teaching in vocational schools consists of experimental teaching, cognitive practice, professional practice, production practice, graduation practice, professional surveys, visits, operation practice and so on. The nature, content and method of practical teaching of different majors are not the same. Therefore, in teaching plans, there will be high requirements on the design and arrangement of practical education. Secondly, lots of time should be spent on practical education. In general colleges, academic periods of practical education were only 20–40% of the total academic periods, while in vocational schools, the percentage is 40–60%, far more than that of general colleges. Thirdly, practical teaching needs hardware constructed of the highest standard. Laboratories, factories used for practice, bases used for practice usually should be built on the highest standard, equipment of labs and relative craftsmanship should keep up with the latest development of factories. Therefore, the investment of vocational schools on the hardware construction of practical teaching is far more than that of general colleges¹³ (Liu 2004).

Teaching in vocational and technical education usually consists of two types, theoretical and practical. Both of them are closely connected and promote one another. Theoretical teaching is mainly the communication of general cultural and professional knowledge, usually in the form of classroom teaching. Practical teaching usually goes on in labs, practical bases and workshops in or out of school, mainly paying special attention to the development of operational skills and working abilities. In vocational and technical colleges, both theoretical and practical teaching are essential. Practical teaching should be based on a certain level of general cultural and professional knowledge, which is theoretical; while, theoretical teaching has to be reinforced and strengthened by practical teaching; practical teaching enriches the content of theoretical teaching. In this way, theory is combined with practice; and what students have learned can be used in practice; this way, students can better acquire knowledge. The development of professional techniques and abilities rely on the close combination of theoretical teaching and practical teaching.

In the course of theoretical and practical teaching, there will be a process developing from simple to difficult, from low to high, from individual to comprehensive. It is such an important matter for educators of vocational and technical schools not to neglect either the relative independence or the combination and cooperation between them. In order to combine theoretical and practical teachings successfully, the methods of case teaching and simulated practicing can be adopted; meanwhile,

¹³Liu Hequn (2004). Study on Technical and Vocational Education. Guangzhou: Guangdong Education Publishing House: 135–137.

after-class time should be made full use of to have all kinds of practical activities related to professional study¹⁴ (Wu 2007).

5.4.4 Cooperation of All Participants During the Teaching Process

It is mainly reflected in cooperation between schools and enterprises, cooperation between teachers and students and cooperation between masters and apprentices.

5.4.4.1 Cooperation Between Teachers and Students

The relationship between teachers and students is basic to the teaching process. Cooperation between them is mainly in the following aspects: First of all, teaching goals reflect the cooperation between them. Teaching goals of technical and vocational education are concerned with the development of students' practical abilities and techniques. Besides, another important teaching goal is to make students able to cooperate with others in practical work. The way out is to create good cooperation between teachers and students in the teaching process. Secondly, the integration, updating and communication will show the cooperation between teachers and students. In the process of teaching, teachers may teach students existing teaching standards, professional knowledge and relative content in the form of classroom teaching or practice after class. Nowadays, knowledge is renewed, transformed and applied at such high rate that the knowledge teachers communicate would be outdated. In this situation, teachers would consider more about the feedback that students got from the practice in the enterprises, and then put the latest information into practice. In fact, this is a process that teachers and students cooperate to integrate and renew the teaching material. Finally, the variety of teaching methods, and teaching organizations also reflects the cooperation of teachers and students. The content of teaching tends to be professional; and professional structure requires the development of teaching form with each major's characteristics. Whether new forms of a teaching remain current largely depends on whether new forms of teaching can be accepted or not. In the process of exploiting new forms of teaching, teachers and students will raise their different views from the angle of teaching and learning. Both sides will communicate and finally decide the teaching form acceptable to both, and the whole teaching process can benefit from it.

¹⁴Wu Xueping (2007). Basis and Application-Study on the Policy of Higher Vocational Education. Hangzhou: Zhejiang Education Press: 34–201.

5.4.4.2 Inter-schools Cooperation

When education improves on the whole and requirements of students become diversified, teaching of technical and vocational education starts to step out and begins to cooperate with other schools. Modern teaching methods make the sharing of teaching resources between general colleges and vocational schools possible. In order to make full use of existing teaching resources and save teaching costs, the sharing of teaching resources between general colleges and vocational colleges has become a tendency of vocational and technical education in China.

5.4.4.3 Cooperation Between Schools and Enterprises

Vocational and technical education includes theoretical teaching in classrooms and practical teaching in enterprises (or in practicing workshops or factories). Teaching plans carried out in the teaching process include two aspects; they are schools and enterprises, therefore, not a single link can be accomplished without the cooperation between schools and enterprises, ranging from the establishing and carrying out of teaching plans to the supervision of the teaching process and to the examination of teaching qualities. Meanwhile, every link of the teaching process is guaranteed by the cooperative education contract or agreement between enterprises, schools and students. In this way, the two parts of higher vocational education, enterprises' training and schools teaching can be connected organically, showing the characteristic that schools and enterprises finish teaching tasks together by cooperation.

5.4.4.4 Cooperation Between Masters and Apprentices

Students of vocational and technical colleges have the double identities of student and apprentice. They are students in school; they take part in the whole process of teaching and receive the supervision and management from schools and teachers. Besides, they are apprentices in enterprise; cooperative enterprises will equip them with relative instructors (or masters). Therefore, we consider the relation between instructors and students as a relation between masters and apprentices. This relation is reflected in the form of cooperation, which between them is the final step towards cooperation of schools and enterprises. This relationship is different from that of students and teachers. In school, teachers will face a large group of students, while in enterprises, the instructors will only direct several students. From the content of this cooperation, instructors usually communicate their own experiences and feelings in the process of teaching students¹⁵ (Wu 2007).

¹⁵Wu Xueping (2007). *Basis and Application-Study on the Policy of Higher Vocational Education*. Hangzhou: Zhejiang Education Press: 34–201.

Chapter 6

Teachers of Technical and Vocational Education



Technical and vocational education is both an important basis of social and economic development and an important support for realizing advancements in industrialization and modernization. The hope of revitalizing the nation lies in education; and the hope of revitalizing education lies on the teachers. The construction of teaching faculty is the requirement demanded for social development. Development of teaching reform and the need to satisfy human resources in the market place are both important in building a good faculty. The quality of the teachers will directly influence the success of their students' education; having a strong faculty is the sign of having strong vocational schools. Strengthening the faculty of technical and vocational education is the basis for improving it.

6.1 Current Situation of Technical and Vocational Education Teaching Faculty

6.1.1 *Structure of Teaching Faculty*

In the construction of technical and vocational education teaching faculty teams, we should emphasize both the individual quality requirement and overall rules and requirements of teaching faculty. The individual's qualities can only be fully utilized and reflected in a reasonable group structure. The overall quality of a school's teaching faculty depends not only on each teacher's quality, but also on whether the structure of the teaching faculty is reasonable and is in the best situation. A reasonable group structure can bring each one's advantages into full play and produce the best results.

The contents of a group's structure includes: Type of structure being implemented, hierarchical structure of the teachers' degrees and their source, quantity, age and title.

Currently, technical and vocational education in China adopts the form of combining full-time and part-time teachers. Full-time teachers are specialized in teaching. These teachers are the main body of a vocational schools' faculty, and play a vital role. They can both be graduates of universities and non-degree experts from industry.

Part-time teachers are hired from related enterprises. The appointment mode of part-time teachers is flexible; they are not restricted by fixed personnel staffing requirements, and stay in their original off campus work units. Introducing part-time teachers can decrease the fixed staffing overhead costs, improve the communication of teaching and skills, and strengthen the close relationship between schools and enterprises. The forms of hiring part-time teachers are various. The following three are the main ones: The first one is to hire part-time teachers or experimenters in guiding potential teachers from among the experts in enterprises' by using their highest level technicians. They are used according to the needs of the school for especially new and marginal subjects. The part-time teachers can be awarded titles corresponding to their original technical titles. The second one is to hire provisional part-time teachers according to the special teaching and skills training tasks needed. For example, if there is no one who can shoulder the course in the school, or the teaching tasks are too heavy, part-time teachers can be hired. Teachers hired in this form cannot be awarded a permanent teachers title. The third one is to choose students from the higher grades as skills training counselors. These part-time counselors mostly work in the basic courses and skill training areas, or help teachers to do some basic work like material preparation and guiding students¹ (Wu 2007).

6.1.1.1 Structure of Teachers' Degree and Source

Degree structure refers to determining the components that goes into making up the value of the various types of teachers' degrees, while source structure refers to establishing a range for the types and qualities of the schools from where the teachers graduated.

The teachers' degree is the reflection of the years of formal education that he/she has received. Under normal situations, it can reflect the level of the teachers' basic theories, skills, and indicate their potential abilities and academic levels. China has certain requirements with regard to teachers' degrees. For example, the Education Committee stipulates that "teachers of cultural courses, professional basic courses, and advanced professional courses at secondary vocational schools should have university diplomas or corresponding degrees. Some professional courses which require solid skills and technologies can also take teachers who have college diplomas." Currently, after further education, the degree structure among technical and vocational education teachers has been optimized; in recent years, many university graduates and some graduate students have been introduced into the teaching structure. In 2005, there were 750,000 full-time teachers in secondary vocational schools; among

¹Wu Xueping (2007). *Basis and Application—Study on the Policy of Higher Technical and Vocational Education*. Hangzhou: Zhejiang Education Press.

all teachers, the proportion of university graduates was 72%, while among secondary technical teachers it was 79%, and among the vocational high school teachers it was 68%² (Liu 2004). In 2014, there were 868,000 full-time teachers in secondary vocational school; among all teachers in vocational schools in the nation, the proportion of teachers with university graduates was 89%, increased by 17% compared with that of 2005.

Source structure refers to the schools from where the teachers graduated. If teachers of technical and vocational education come from different schools, they will bring along different academic atmospheres, and characteristics which can be mutually enriching. To a basic school, the percentage of teachers who come from the same school should not be more than 25%; the percentage of teachers who come from the same school and had taken the same major should not surpass 20%. In recent years, since the emphasizing of schools and related departments towards the teachers' source structure, the mixture of the technical and vocational education teaching faculty has been greatly improved. Take the Shandong Province as an example, since the establishment of the provincial technical and vocational education teaching faculty training center, the teachers come from different schools and the source structure is good.

6.1.1.2 Title Structure

The title structure of technical and vocational education teachers refers to the percentage of teachers with various titles among all the teachers. The title structure of technical and vocational education teachers reflects their teaching levels to a certain extent; it is one of the scales for measuring the level and quality of a school's teaching faculty. A reasonable title structure is beneficial to mobilize and give full scope for the teachers' initiative and creativity, it also favors the overall improvement of the teaching faculty.

According to the needs of a school, as far as the number and types of majors and teaching degrees needed, a reasonable title structure should be: Each class should have at least one lecturer; each major should have at least one senior lecturer. Thus each major can have at least one backbone teacher as the academic leader, each class should have at least one core teacher who has a secondary title.

Currently, with the development of technical and vocational education and the extension of school time, the title structure of technical and vocational education teachers is getting more reasonable.

²Liu Hequn (2004). *Vocational Pedagogy*. Guangzhou: Guangdong Higher Education Press: 142–154.

6.1.1.3 Age Structure

The age structure of technical and vocational education teachers refers to the age of the teaching faculty. Usually older teachers work more steadily and have more experience, while younger teachers have more energy and are more likely to learn new knowledge. They have their own advantages and they complement each other. If a school has a reasonable ratio of the elder, middle-age, and younger teachers, they can not only do the job better, but also maintain the steadiness, continuity, and heritage of the teaching faculty.

Age structure reflects the tendency of the teachers' potential and can rise and fall to a greater extent. Under normal situations, the technical and vocational education teaching faculty should form a reasonable age echelon, to avoid the problem of having the whole teaching staff becoming old at the same time, and avoid the problems among teachers within the same age group. Usually, the youngest teacher is about 21 years old; by the time of retirement at 60, they would have worked for 40 years. The 40 years can be divided into three stages: The first stage is 21 to 30 years old. In this stage, teachers are active and full of energy, but they lack experience. They need the older teachers with teaching experience to guide them according to the work needs, to adjust their knowledge and knowledge structure, and especially to improve and refine their practical teaching abilities. The second stage is 31 to 50 years old. In this stage, teachers are at their peak of performance; they are energetic both physically and mentally; it is the golden stage for them to bring their abilities and wisdom into full play. The third stage is 51 to 60 years old. In this stage, the teachers' physical situation is getting worse and their work could have a tendency to decline. So in order to have the teaching faculty remain in the best working situation, and make steady progress, the reasonable age structure should be: Teachers from 21 to 30 years constituting 25%, teachers from 31 to 50 years 50%, and teachers from 51 to 60 years take up 25% of the total faculty.

Currently, the age structure of technical and vocational education teaching faculty shows a tendency of getting younger, to a certain extent. On the one hand, this brings in greater vigor and energy, but on the other hand, the low percentage of teachers who have a rich teaching experience brings some worries.

6.1.1.4 Quantity Structure

Having a certain quantity of teachers is the key to fulfilling the teaching tasks. Whether the quantity structure is reasonable or not depends on the following two factors.

First is the ratio of the number of teachers to students. The ratio of the number of teachers to the number of in-school students, for a certain major, is an important basis for determining whether the quantity structure is reasonable or not. According to the various majors, and the links to their various requirements like experiments, practice, scientific consultation, social service, and science and technology promotions, the

ratio of teachers to students should be about 1:10. Currently, with the increasing number of enrollments, the problem of a faculty shortage is obvious.

Secondly is the percentage of professional teachers and full-time teachers. Currently, in secondary vocational schools, professional teachers and practice student teachers are not distinctly separated; that means they are both professional teachers and student teachers being regarded as equals. Under such a situation, the ratio of professional teachers among all teachers cannot be separated from the class time ratio of cultural, professional, and practice courses. Currently, the ratio of the three kinds of courses in China is about 4:3:3, and 3:3:4 in some majors, the percentage of professional teachers among full-time teachers should be about 1:1.5; that means professional teachers account for about 60% to 70% of all full-time teachers. The quantity of professional teachers in vocational schools still falls below the desirable level to meet the needs of effective teaching³ (Du 2005). Because of the characteristics of teaching in technical and vocational schools, instructor-engineer teachers are needed, that is, teachers can conduct both theoretic teaching and instruct students to do the specific jobs. According to the Standard of Secondary Vocational Schools issued by the Ministry of Education in 2010, the percentage of double-qualified teachers should not be lower than 30%, but in 2011 it is 23.7%, while in 2012 it is 25.2%, failing to satisfy the standard.

6.1.2 Cultivating and Training System of Teaching Faculty

The construction of a technical and vocational education teaching faculty not only needs a reasonable group structure, but it should also emphasize the cultivation and training of its teachers. Through cultivation and training, they can meet the needs of cultivating their students. The cultivating and training system of technical and vocational education teachers, in our country, mainly has two phases: Pre-service and in-service training.

6.1.2.1 Pre-service Training

The pre-service training of technical and vocational education teachers is done through normal universities and colleges, vocational normal colleges, or in the form of co-cultivation of enterprises and research units. Presently, we have established independent technical and vocational normal colleges, or set up technical and vocational normal departments in institutions of higher learning, to shoulder the task of cultivating qualified professional teachers and practice student teachers. Currently, the vocational normal education system has gradually been established. Those schools enroll students nationally or from within certain areas; the students cultivated are the

³Du Jize (2005). Study on Technical and Vocational Education under Socialism Market-driven Economy. Beijing: Economic Science Press: 241–259.

main source of technical and vocational education teachers. The pre-service training of technical and vocational education teachers is implemented in the following ways.

Normal universities and colleges in our country have been firmly established. Seen from the majors offered, they cover most of the majors required for a technical and vocational education. Higher schools play a vital role in cultivating technical and vocational education teachers. The main ways are: Opening technical and vocational education teachers departments, teaching majors or teaching faculty classes to cultivate teachers for vocational education. The teaching plans of the technical and vocational education teacher departments are adjusted on the basis of the same or similar majors' teaching plans. The original graduation practice and design was adjusted, by decreasing professional elective courses, increasing the number of courses like pedagogy, psychology, and teaching methods, and strengthening the real practical training within the possible systems. Educational committees, and related institutions of higher learning, have done a lot of work in the cultivation of technical and vocational education teachers. Early in 1982, Shandong Province established a technical and vocational education major in the Shandong University of Technology and Shandong University of Agriculture, to cultivate professional teachers for vocational schools. Up to 1989, there were 160 institutions of higher learning that have established departments for technical and vocational education teachers, teaching majors, or teaching faculty classes. It is nationally stipulated that the technical and vocational education teachers departments, majors, or faculty classes in institutions of higher learning can enroll graduates of secondary vocational schools. Those students understand the situation of vocational education, have a level of high enthusiasm for teaching and practicing, and they volunteer to go back to their original vocational schools to work. It is beneficial for the improvement of teachers' quality and structure.

Vocational normal colleges are the special institutes for cultivating technical and vocational education teachers. They mainly shoulder the task of improving shared professional teachers and teachers where there is a great shortage; they also shoulder the task of renewing teachers' knowledge, training for specific applications, and in the spreading of new technologies, researching technical and vocational education and teaching methods, popularizing modern teaching methods, and spreading technical and vocational education information. So they are of vital importance in the technical and vocational education teachers' training system.

As to the developing of educational targets, vocational normal colleges were established to cultivate professional teachers and practice student teachers for vocational schools. These same colleges also stress the development of teaching plans, curriculum settings, and teaching arrangements. Except for the general cultural courses and the professional courses, they also offer courses in pedagogy, psychology, teaching methods, and certain classes of practice to strengthen the development and training of students' teaching abilities and methods. According to the requirements of vocational education's development for professional teachers, those colleges deepen program reforms, enlarge the directions of majors, strengthen basic theories of teaching to have the students grasp broad and sound basic theories.

The professional teachers who are difficult to cultivate by the higher schools or vocational normal colleges independently, can be cultivated jointly by higher schools, vocational normal colleges, enterprises, and research units. Those teachers are mainly the teachers required by the new majors and new technologies to have specialized knowledge/skills. Vocational normal colleges can shoulder the cultivation of pedagogy, psychology, teaching methods, and related practice; related production departments shoulder the cultivation of new technology theories, structure and design theories, production techniques, commission and installation, fault analysis, and the training of real operations. Co-cultivation is an effective mode, but there are still some problems to be solved in its real-life operation, for example, the source of students, the establishment and sustainment of a cooperative relationship, especially under the situation of the real market economy; the relationship of co-cultivation is getting more complicated which needs further study and improvement.

In the development of vocational education, vocational schools have introduced some professional technicians to shoulder the professional teaching and practical guidance. After appointment, these technicians will be given related educational and teaching theories training by the vocational schools.

From the 1950s to 1980s, educational departments inducted many engineering technicians to work in their vocational schools. The reality of the experience testifies that introducing professional technicians as full-time teachers or part-time teachers is an important measure in strengthening the formation of a technical and vocational education teaching faculty and improving its quality. It can not only bring the technicians' specialties into full play, but is also beneficial for the improvement of relationships between schools and enterprises.

6.1.2.2 In-Service Training

In-service training is an important measure of adapting to the changing society and improving technical and vocational education teaching quality. The training content is divided into educational theories, engineering technologies, and production operation skills.

Currently we have a relatively complete training system. About 40 training bases have been established for training technical and vocational education teachers, many of them have good equipment and advanced training methods; they shoulder the task of training in-service teachers. Except for taking part in the various training classes in those bases, many schools emphasize teachers' post training, from the eldest to the youngest, with good effects. Many schools mobilize teachers to take part in the reform of teaching content, methods, means, and evaluation of methods. It has had good results in realizing better improvement targets and improving teaching quality.

The current in-service training is mainly arranged according to the change of the schools' major environment or the needs of the schools' teaching, research, and production development. Teachers are sent to receive training in a rotating schedule to improve their professional knowledge and skills, many teachers study

for a master's degree. The in-service training of technical and vocational education teachers mainly has the following forms.

The vocational level of vocational schools' teachers can be improved through advanced studies. Organizing teachers' in-service advanced studies is an important form of strengthening teachers' knowledge and skills. The advanced studies in our country mainly have the following forms: The first one is joining classes, which means that teachers can study for some courses in or out of the school while fulfilling teaching and skills training tasks. The second one is to hold teachers' advanced study classes, which means that teachers management departments organize various in-service advanced study classes within the schools, for example, foreign language, computer training, accounting training, marketing, and so on. The third form is to organize lectures and symposiums, according to the teachers' needs, making full use of the schools' resources; schools, teaching, and researching sections hold lectures on teaching and skills to enlarge the teachers' knowledge and improve their level of attainment in these areas. The fourth form is learning after being released from work, according to the teachers' real life situation. Arranging teachers to learn full time is an important mode of cultivating teachers. For example, choose and send young teachers to study for a master's degree, doctorate, or second undergraduate degree to improve their theoretical level, enlarge their knowledge, and consummate the degree structure and knowledge degree among teachers. The fifth one is go abroad for advanced studies; some majors and technologies are introduced from foreign countries, and some countries have new advanced technologies. In order to introduce the latest majors and technologies into the classroom, vocational schools organize teachers to go abroad to study the advanced technologies and acquire the latest knowledge.

Vocational schools in China emphasize the cultivation of the teachers' self-study ability. As teachers, the knowledge they learnt during the period when they were in school is limited. About 80% of the knowledge is supplemented by self-study when working, about 20% of the knowledge is acquired when they were studying in school. So the cultivation of teachers' self-study ability is quite important. Self-study ability includes the ability to read academic masterpieces and scientific journals, the ability to consult materials, the ability to read various reference books, and so on.

Vocational schools are paying more and more attention to the teachers' practical ability. Some vocational schools regularly send teachers to practice in enterprises. When practicing in enterprises, teachers can get professional knowledge and practical skills from the experts and engineering technicians, learn the advanced management methods and the science and technology; they can learn the spirit of utter devotion from the workers. It is of vital meaning to the cultivation of the teachers' moral, teaching, mental qualities and vocational skills.

Before going to work, technical and vocational education teachers would have acquired the necessary "degree" and "diploma", but the necessary experience and teaching skills have to be acquired by constant training and practice. The teachers' post training aims to improve teachers' moral quality and working quality. It helps teachers to acquire the necessary knowledge and ability to do certain work. Post training is the need of the post's position itself and is an important basis for making

sure whether they are qualified for a certain post. It is of vital importance to encourage teachers to take part in training and be a teacher who matched their title. Carrying out the principle of improving according to the needs of the teaching posts, helps teachers to be qualified after training, and it provides the basis for them to gain higher titles⁴ (Liu 2004).

Generally, teacher training is designed by training colleges or universities, and all parts of training program are delivered by local teachers/trainers, mainly in lecture format. However, in some training program, such as in overseas training, other formats such as semi-structured lectures, workshops and team learning are implemented. Action-oriented methods are also used in some seminar discussions. Since new training objectives oriented to vocational competencies have been recognized by MoE and regional policy makers, subsequent training programs have begun to recognize that teachers should expand their professional knowledge and pedagogical skills, and strengthen their awareness of environmental protection, team work, personal communication and other transferable competencies.

With regards to online training, there is a lack of effective interactive learning platforms to guide the discussion and interaction among trainees after the completion of their training. In addition, some rural schools have relatively poor access to information technology. There is also a lack of online information platforms for the government and training institutions. In 2002, MoE co-designed an education platform for teachers, which mainly provides distance-learning support to primary and middle school teachers and is a part of the rural regional vocational school teacher network. This new distance learning system includes the provision of in-service training and pedagogical support for national teacher training⁵ (Bao 2012). In 2012, 11% of all teachers were trained through face-to-face lectures while 89% were trained through distance training.

6.1.3 Management of Teaching Faculty

6.1.3.1 Source of Teachers

Like the teachers of general education, teachers of vocational schools also shoulder the task of cultivating talents which are needed by the society. However, compared with general education, technical and vocational education has a different schooling direction, students' cultivation targets, teaching content and methods. These lead to the differences between the source for vocational schools' teachers and the source for general schools' teachers.

⁴Liu Hequn (2004). Study on Technical and Vocational Education. Guangzhou: Guangdong Education Publishing House: 142–154.

⁵Bao Huaying (2012). Development of Teacher Training in China. International Research and Training Centre for Rural Education (INRULED). <http://www.inruled.org/iERD/> (retrieved 05.02.2014).

The fast development of technical and vocational education in China began after the Third Session of the Eleventh Central Committee of the Communist Party. At first, many schools were rebuilt as normal high schools. They adapted to the needs of the economic development with applied talents. So the constitution of current vocational school teachers has its own historical reasons. Teachers of cultural courses are former teachers of normal schools or are introduced from normal colleges, while the source of professional courses teachers in vocational schools is complicated. They mainly have the following origins.

Converted to a profession from cultural courses teachers. Most vocational schools were rebuilt from normal high schools. After rebuilding, because of the change in the curriculum arrangement and teaching content, the percentage of cultural courses decreased from 100 to 30%. Due to the decrease of cultural courses, on the one hand, there was a surplus of cultural courses teachers; on the other hand, there is a lack of professional courses teachers. In this situation, many cultural courses teachers were made to teach some professional basic courses and professional courses, which were close to their cultural courses. It was important for the development of vocational schools and at the same time it relieved the burden of professional courses teachers. Generally, these teachers had received a higher education and had a wide range of knowledge. After being trained for a short term, they become qualified for the teaching job.

Introduced from university and college graduates. At the beginning of the 1990s, China implemented the system of distributing graduates according to centralized plans. In order to solve the problem of the lack of professional teachers, each year there would be some university and college graduates chosen to teach in the vocational schools. Though these graduates had a certain level of professional knowledge, they have not received the specific training for these professions and they were weak in practice. To solve this problem, together with the universities and colleges, technical and vocational education teaching faculty training centers established a series of classes; they added pedagogy psychology, and teaching practice into their teaching plans. Many schools emphasized developing the students' practice and their ability to performing experiments to improve their operational abilities.

Some of the outstanding graduates were chosen to remain at the school as teachers. Choosing some of these excellent graduates to remain at their vocational school to become practice student teachers has had a certain effect in the development of vocational education. Vocational schools in Beijing adopted this measure, by passing the college entrance examination for adults; these teachers can improve their degree and working abilities. Choosing some graduates to remain at the schools was a measure used before and after 1990s; they were a source of practical student teachers, because in many schools they were already professional teachers or technicians in teaching the practical basics.

Professional teachers are provided by cooperative enterprises. Since some majors are co-held by vocational schools and some enterprises, graduates will go to work in those enterprises. So according to the teaching needs, enterprises choose some

qualified personnel to work as professional teachers in vocational schools; it is beneficial for the realization of the cultivation target and the implementation of the students' practice.

Engage part-time teachers. Full-time teachers are the main body of the technical and vocational education teaching faculty. Part-time teachers are supplemented. For the basic/classical majors, the teachers are mostly full-time; for the newer/specialty majors and training classes, the teachers are mostly part-time. The teachers engaged are mostly skillful craftsmen or retired teachers from universities and colleges. These people have specialties and have played an important role in the various skills training classes. It is a common practice in vocational schools to hire part-time teachers.

Simply speaking, in the documentation of vocational schools teachers, we adopted the methods of changing, distributing, remaining, and engaging, which have shown good results⁶ (Du 2005).

6.1.3.2 Teachers Engagement and Qualification

Currently, technical and vocational education adopts the system of full time engagement and competitive employment in the management of a teaching faculty. The document, Advice on Hastening the Reform of Institution Manning System, co-issued by the Organization Department and Ministry of Personnel of the Central Committee of Communist Party of China (CCCPC) points out that we should break the life-long system of using the cadres identifications and introduce the competition system. The document also recommended implementing this employee hiring system in the institutes, making it the basic personnel recruitment and advancement system for all institutes. According to the needs of a subjects formation, teaching, and scientific research, vocational schools should set teachers' post properly, and clarify the post's, qualifications, rights, duties, and engagement terms. Through fair competition, they choose the best ones, and eliminate the worse ones. Those engaged should be only those who have the teachers' qualifications. After engagement/employment, it is necessary to strengthen the management and complete the evaluation of the system.

As to professional qualifications, our country implements a teacher qualification system; one with the corresponding qualifications can be engaged as a vocational school teacher. It is stipulated in the Teachers Law of the Peoples Republic that "All Chinese citizens, who abide by the Constitution and laws, take a keen interest in education, have sound ideological and a moral character, possess a record of formal schooling as stipulated in this Law, or have passed the national teachers' qualification examinations, and they have the educational and teaching ability may, after being evaluated as qualified, obtain the qualifications for teachers." Article 11 stipulates, "to obtain qualifications for a teacher in a junior high school, or a teacher for general knowledge courses, and specialized courses in a primary vocational school, one shall

⁶Du Jize (2005). Study on Technical and Vocational Education under Socialism Market-driven Economy. Beijing: Economic Science Press: 241-259.

be a graduate of a specialized higher normal school, or other colleges or universities with two or three years' schooling or upwards." Besides, the stipulations of the higher vocational schools teachers' degree is the same as that for normal universities, that is "acquiring higher schools teacher's qualification one should have a master's degree or bachelor's degree."

6.1.3.3 Construction of Teaching Faculty Management System

The technical and vocational education teachers' management system in China is getting perfected and a series of policies and documents have been published. In 2000, the Ministry of Education and National Education Labor Union issued the Secondary Vocational Schools Teacher Professional Moral Regulation to improve the teachers' moral development; the Ministry of Education and Degree Council of the State Council issued the Notice of Implementing the Work of Secondary Vocational Schools Teachers Studying for in-service Master's Degree, which opens up special ways for in-service teachers to study for a master's degree; and the Ministry of Education issued the Advice on Strengthening the Construction of Secondary Vocational Schools' Teachers Training Bases, to improve the building of the technical and vocational education teachers system. In 2001, the Ministry of Education issued the Advice on Strengthening the Construction of Secondary Vocational Schools Teaching Faculty, which designs plans for the building of the technical and vocational education teaching faculty. In 2003, the Ministry of Education issued the Advice on Strengthening the Work of Training Vocational Schools' Headmasters to improve the training of headmasters to make it more systematic. In 2005, the Chinese central government issued an important document entitled A Decision to Vigorously Develop Vocational Education to promote the development of vocational education (MoE 2005). This document stated that 1000 demonstration vocational schools and 100 demonstration vocational colleges would receive special government funding, and vocational education teachers would also be supported to enhance their competencies gained in real work environments. Specialized course teachers were required to work in enterprises for two months every two years. Part-time teachers from enterprises were encouraged to teach in vocational institutes and vocational education teachers were also encouraged to obtain professional certificates related to professional sectors. In 2006, the Ministry of Education issued the Advice on Establishing the System of Secondary Vocational Schools Teachers Practicing in Enterprises, with stipulations for teachers' practicing in enterprises. Different provinces and areas have different modes.

In September 2013, MoE issued standards for secondary vocational teachers. These standards emphasized that vocational education should embody a student-centered philosophy and that teachers should cultivate the professional interests, confidence, initiative and creativity of students. Vocation learning should integrate in-school learning and work-based learning, and the development of lifelong skills should be emphasized in order to train the students' practical skills. In the teaching process, teachers should pay more attention to the development of comprehen-

sive competencies, which include innovation, practical skills, self-regulated learning skills etc. In other words, more attention should be paid to transferable skills. In 2014, the document Decision of the State Council on Accelerating the Development of Modern Vocational Education was issued, it stipulated that the government should play the leading role in the transformation of general education towards applied technology in higher education, improve the mechanism of enterprise participation and require teachers to possess both teaching qualification and vocational qualification. The document Planning for Building Modern Technical and Vocational Education (2014–2020) stipulated that, based on the characteristic of vocational education, the qualification standards and professional titles of technical and vocational education teachers are to be improved. The quota for new teachers should be used to bring in teachers with professional practical experiences, so that by 2020 the number of teachers with practical professional experiences would account for more than 60% among all the full-time or part-time technical and vocational education teachers. Technical and vocational education institutions are encouraged to employ management staff in enterprises, engineering technical persons, and skillful craftsmen. Training centres for teachers are to be built with the support from high-level schools and medium-sized enterprises, where training can be institution-oriented and based on the ‘degree diploma+enterprise training’ modality. Regular practical training mechanism is to be established so that new teachers must firstly go through practical training and all teachers must regularly get practical training. The Administrative Rule on Enterprise Based Practical Training for Vocational School Teacher (trial) is in the phase of public consultation since October 2015, in which it is legally required that technical and vocational education teachers who teach specialized courses shall have no less than six months practical experiences every five years according to their specializations.⁷

6.1.4 Problems with Teaching Faculty Construction

There still exist some problems in the technical and vocational education teaching staff’s size and structure; they are mainly reflected in the following factors.

First, vocational and technical normal colleges are fewer in quantity and smaller in size. Their graduates can hardly meet the needs of vocational education. Because the improvement targets of engineering universities make their graduates unwilling to work as vocational schools teachers, it results in the limitation in the number of new technical and vocational education teachers’ from these schools; the quantity of teachers cannot conform to the technical and vocational education supply demands. The ratio of secondary vocational school students and teachers has surpassed 21:1 which is higher than that of the normal high schools and that of foreign countries. According to the statistics of MoE, the number of in-school students of secondary

⁷UNESCO-UNEVOC (<http://www.unevoc.unesco.org/>) World TVET Database China February, 2016.

vocational education has reached 17.55 million in 2014; according to the current ratio of students and teachers, we still need 250,000 teachers.

Secondly, teachers have relatively low level degrees; their professional skills level and practice teaching ability are also weak. A survey of 40 higher professional schools, higher vocational schools, adult higher schools and secondary vocational and technical colleges in universities in Jiangsu, Liaoning, Hunan, Shanxi and Sichuan Provinces shows that these schools have much fewer teachers with senior title; academic leaders are even rare (Wang 2008). In 2014, the proportion of teachers with senior titles in higher vocational colleges was 29.4%, which has only slightly increased by 0.1% compared with that of the previous year. (MoE 2014) In many vocational schools, teachers are not adequately trained, and many of them lack practical experience in enterprises. China's modern vocational education was developed relatively late. Traditionally, Chinese society has regarded theoretical knowledge as being more important than practical knowledge, as a result, in some schools, students spend much more time on theoretical learning, and they are unable to put their knowledge into practical use.

Thirdly, the structure of the faculty is unreasonable for the following reasons: The first one is the lack of "dual-competency" teachers. In 2005, there were only 57,000 full-time teachers who were dual-competency in higher vocational schools which take up a percentage of 21.3%⁸ (Guo and Chen 2007). And in 2014, the percentage has increased to 27.6%, which is still far less than the required 50% (MoE 2014). The second one is the lack of professional courses teachers and practice guiding teachers. Currently, the ratio of cultural courses teachers and professional courses teachers is 1:0.6, which is far less than the required 1:1. Besides, due to the limitation of manning the system, schools can hardly engage the number of experts and professional personnel to work as professional courses teachers or practice student teachers⁹ (Bao 2007). The third reason is the imbalance of the teachers' title structure. According to the survey, teachers with senior titles in secondary professional schools and vocational high schools account for only 17.9 and 9.93% respectively, while teachers with elementary titles account for 31.56 and 49.81% respectively. This reflects that vocational schools lack a backbone of teachers and academic leaders. The fourth one is that the teachers' age structure is unreasonable. Teachers of most technical and vocational schools are mostly 30–38 years old. Middle aged teachers and older teachers make up a low percentage. According to the statistics, teachers who are younger than 35 in secondary professional schools and vocational high schools account for 56.76% in secondary professional schools and 61.19% in vocational high schools, while the middle aged teachers who have rich experience account for only 26.96% in secondary professional schools and 20.66% in vocational high schools¹⁰ (Zhou

⁸Guo Yang, Chen Juan (2007). Preliminary Analysis on the Level of Technical and Vocational Education Teaching Faculty Construction. *Vocational Education Forum* (12): 16–20.

⁹Bao Yan (2007). Problems in the Building of Higher Education Teachers and the Countermeasures. *Journal of Tonghua Normal College* (12): 104–106.

¹⁰Zhou Yanli (2007). On the Construction of Teaching Troop in Secondary Vocational Education. *Education and Vocation*, 12: 55–56.

2007). The young teachers, who make up highest percentage, lack the practical experience, for example, they are weak in practical and operational ability, and are poor in teaching effect.

The cultivation of technical and vocational education teachers in China lacks vocational characteristics and strict vocational training. The majors of normal college graduates, who work as basic courses teachers in vocational schools, are single; engineering university graduates, who work as professional courses teachers in vocational schools, lack professional educational training and practice. Practice student teachers in the schools and training teachers in the enterprises mostly haven't received special training.

Besides, the management system of technical and vocational education teaching faculty still needs to be consummated, the part-time teachers' policies are not perfect. An employment system which adapts to the characteristics of vocational schools has not yet been formed. Though a series of documents have been issued, there is still a lack of corresponding educational policies for a teacher's employment, title evaluation, and encouraging system. For example, as to the problem of title evaluation, applying the standard of normal higher schools is unscientific. Starting from the task of vocational colleges, teachers are required to have a teaching quality, ability, practical experience, and an operation ability. While the title evaluation standards require not only the teaching requirements above, but also research work, published books or papers, while the requirement for actual practical ability is weak, and the regulation is rigid, not allowing for exceptions.

6.2 Traits and Requirements of Technical and Vocational Education Teaching Faculty

Compared with general education, the combination of theory and practice is the basic characteristic of vocational education. According to the regulation of technical and vocational education in the International Standard Classification of Education (ISCED), which is published by UNESCO, a technical and vocational education should better reflect the specialties of vocations, and its cultivation targets are mainly technical talents. The characteristic of technical and vocational education leads to the special requirements for technical and vocational education teachers.

6.2.1 Traits of Teaching Faculty

The target of vocational education is to improve the technical and skilled talents. The orientation of technical and vocational education decides the characteristic requirements for technical and vocational education teachers. Chinese technical

and vocational education teachers have the following characteristics: The teachers' structure is varied; professional and dual-competency teachers are the main part in the teaching faculty.

6.2.1.1 Variety of Teaching Faculty Constitution

Based on the specialties of vocational education's talents cultivation, the make up of the teaching faculty in technical and vocational education is diverse: There are both full-time and part-time teachers; general, cultural, and professional teachers; theoretical and practical teachers.

Considering the requirements of each subject of vocational education, the technical and vocational education teachers' quality should be broader, more abundant, and more professional than those of general schools' teachers. It is expressed especially that teachers are required to pay more attention to the relationship between theory and practice while teaching. Especially, the requirement of professional theory courses is to meet the real needs of the vocations or vocation groups. They should have strong practical application and direction. Vocational practical courses include training, practice, graduation design, and experimental courses, which are set independently. Its content is to help students grasp vocational skills; the cultivation of intellectual skills and practical ability are especially emphasized. So compared with general schools, technical and vocational teachers are required to grasp the basic theoretical knowledge, as well as have a rich working experience, and solid practical ability.

Vocational schools usually have part-time teachers. There are two ways of employing part-time teachers: The first one is to hire part-time teacher from enterprises. Part-time teachers are mostly professional courses teachers. They usually make up 30–40% percent of the total faculty. According to the characteristics of running an educational institute with the support of enterprises and industries, engaging engineering and technological personnel in schools and opening them to lectures on industries' new knowledge, technologies, and management methods, can not only strengthen the technical and vocational education teachers' ability for application, but can also enrich the current professional courses teachers. On the one hand, part-time teachers can solve the shortage problem of practical courses teachers; On the other hand, part-time teachers are helpful in connecting schools and the society which improves the benefits of both. Secondly, in the case of some courses which require special skills or subjects, and majors which change fast, we can engage some part-time teachers. They can have special talents from various industries, but they must understand the targets and characteristics of vocational education, and be familiar with their academic major. Part-time teachers are important forces to the technical and vocational education teaching faculty; they not only supplement the lack of technical and vocational teachers, but also improve

the teaching of production knowledge and skills, improve the transformation from knowledge to skills and improve the education and teaching level.

In a word, one of the characteristics of technical and vocational education is that it is closely related to real production, so special talents from different industries who have a rich production experience are important forces for the higher technical and vocational education teaching faculty. Engaging professional personnel as part-time teachers can not only improve the teaching quality, but also save on expenditures; what is more, it can strengthen the connection between schools and industrial departments to cultivate corresponding talents¹¹ (Wu 2007).

6.2.1.2 Specialty of Teaching Faculty

With the development of vocational education, the specialty of technical and vocational education teachers is getting more and more conspicuous, which is reflected in the following factors.

The completion of a specialty education includes the required systematic and complete professional theories, adequate basic theories, and professional skills at different levels. Teachers should not only grasp practical skills, but also have creative skills (design various experiments, deal with the subject of design and solve problems). In vocational schools, the completion of the teachers' specialty training is important and the requirements of applying professional skills are also high.

Teachers of vocational schools are required to have wide professional teaching abilities. It is reflected in: The requirement of combining theory and practical teaching. Teachers should be competent at teaching several courses in their major area. Professional basic courses teachers should not only be competent at teaching in professional classrooms, but also be competent at guiding the curriculum design, graduation design, thesis writing, and so on.

Since the cultivation targets of technical and vocational education is to improve the applied talents of those who can work in the frontline of production, teachers themselves should have a strong professional application ability, or professional implementation ability. For example, cultivating technicians who are going to work in production, teachers of engineering majors have to be competent at equipping, debugging, testing, and fixing breakdowns as well as solving complicated technological problems, or equipment problems in production. Instructors of cultivating management and business personnel, as well as teachers of finance, politics, and law, should be competent at accounting management, running and management of production, and public management, as well as analyzing, deciding and solving complicated problems in a business. But the requirement of the teachers' application ability reflects the characteristic of the professional application rather than the characteristic of the individual post's operation; reflects the professional application of ability

¹¹ Wu Xueping (2007). Basis and Application-Study on the Policy of Higher Vocational Education. Hangzhou: Hangzhou: Zhejiang Education Press: 34–201.

rather than the professional theory about ability; the above two are clearly different from the ones in technical schools and general high schools¹² (Dong 2006).

6.2.1.3 Dual Competency Teachers Are the Main Body

A dual competency teacher of vocational schools is one who has both the qualification of being a vocational school teacher and the qualification of being a professional technologically skilled person. For example, a teacher is both a lecturer and an engineer, both a professor and a senior engineer. From the cultivation target of vocational education; we can see that dual-competency teachers mainly cultivate skilled talents. So in addition to the necessary qualities that are required, teachers should have mastered the qualities of technological talents. Compared with general schools, vocational school teachers should have a wider range of knowledge and skills. They should have a sound theoretical basis and rich practical experience, as well as the ability of comfortably handling social activities.

Based on the conclusion drawn from the research, practical experience, and the advanced experience of foreign countries, the Ministry of Education pointed out that dual-competency teachers should conform to one of the following conditions: First, having at least two years' experience in production, construction, service and/or management on the frontline, be able to guide the practical teaching, and have the title of lecturer. Secondly, have the title of lecturer or higher title and a secondary title or higher title of a certain vocation. Thirdly, support (or take part in) at least two applied projects, and conducted the research that has been applied to enterprises and institutes that resulted in good economic benefits. On this basis, dual-competency teachers are considered as the cultivation target for technical and vocational education teachers.

The nature of "dual-competency" is the double requirements toward vocational school teachers as industry experts and teaching experts, and the two requirements are mutually related. The standard of "dual-competency" teachers is high. In order to meet this standard, the teachers' background and experience in enterprises are emphasized; teachers should hold part-time jobs in enterprises. As to teachers of a certain type, for example, teachers who only have experience in teaching in schools, such a requirement is necessary, but not enough. As a vocational school teacher, they should have constant contact with enterprises and academic circles. Besides, as to the relationship between teachers and enterprises, we should apply the dynamic views to look back on their previous background, experience, and the cooperative relationships held currently. Since "dual-competency" is a high standard, it is an overall target of a teacher's growth. As to the requirement of teachers' structure, each major, or at least each important major, should have at least one "dual-competency" teacher. Teachers should have different targets in different growth stages; we should evaluate them under three aspects: Teaching, taking part in social activities, and

¹²Dong Buxue (2006). Study on Higher Technical and Vocational Education. Nanchang: Jiangxi College Publishing House: 112–115.

social service. An important characteristic of the technical and vocational education teaching faculty development is to cultivate “dual-competency” teachers. There are several reasons: First, cultivating “dual-competency” teachers is needed for hi-tech development. With the changing and renewing of modern science and technology, the tendency of economic globalization and the fierce economic competition, it is urgent to cultivate “dual-competency” teachers. On the one hand, the development of modern science and technology leads to the constant improvement of the scientific content in working posts like production, service, and management. Many professional theories are closely combined with real production technologies; the operational process itself is complicated mental work. Cultivating “dual-competency” teachers and strengthening the practice can improve the transformation from scientific and technological theory into real production forces. On the other hand, the main task of schools is to teach mature technologies. While fully developed new technologies are first applied to the key or big enterprises, which developed the new technologies, the new technologies are then applied to production and service management in other circles; but the content of textbooks always lags behind and can't follow the latest scientific and technologic developments. Taking part in the front-line production or joining the evaluation of a social technology title, teachers can follow and grasp new theories and technologies in time. Secondly, cultivating “dual-competency” teachers can improve the combination of teachers' theories and practices. Technical and vocational education teachers mostly come from related higher schools. Universities aim at cultivating academic talents, so they lack the professional practical experience. Advocating “dual-competency” teachers can stimulate teachers to acquire operational skills. Through repeated practice and operation, teachers can overcome/improve their weak points and realize the target of “teaching” and “operating”. Thirdly, against the background of modern knowledge economy, the life-long technical and vocational education will become an unenviable tendency; technical and vocational education will become an important part of a life-long educational system. Many people will come back to vocational schools to learn new technologies and/or update their knowledge and skills. Teachers are required to follow the new sciences and technologies in theories and practice, and apply the latest developments in their vocations. Fourthly, cultivating “dual-competency” teachers is the key to improve education and teaching quality. Currently, one of the problems that technical and vocational education faces is that professional theory teachers cannot guide practical teaching, while practical teaching teachers cannot teach professional theory courses. The separation of professional theory and practical teachers affects the teaching quality and the cultivation of qualified talents. Improving high quality teachers with the necessary theoretical knowledge and solid practical abilities requires a “dual-competency” teaching staff. So establishing a “dual-competency” teaching faculty is beneficial for the teaching plan design, which combines theory and practice; it is beneficial to compile a textbook which combines both theory and practice.

In a word, high quality teachers not only have the knowledge, but can also apply it. Technical and vocational education's main characteristic is that it requires students to have enough of the necessary professional basic theories and the ability to apply them.

Teachers are the implementers of theory courses, guiders of experimental courses, the developers of the combination of production and learning, and participants of school management. Establishing a teaching faculty in which “dual-competency” teachers are the main body is the key link in constructing a technical and vocational education teaching faculty¹³ (Wu 2007).

6.2.2 Requirements of Teaching Faculty

The above characteristics of technical and vocational education teachers place high requirements upon the teachers’ quality and ability. With the development of vocational education, the requirements are getting higher.

6.2.2.1 Required Qualities of Technical and Vocational Teachers

According to the characteristics of technical and vocational education teachers, professional teachers should have qualities of moral and cultural knowledge, practical skills, technical and vocational education theories, science and technology promotion, social communication skills, and so on.

The moral quality of vocational school teachers has two parts: A political moral quality and professional ethics. Technical and vocational education teachers should have high political and moral qualities. This is because teachers are not only the tutors of students, but also the molder of the students’ thinking; imparting knowledge and educating people are the duties of teachers. Students of vocational high schools are at a stage when their world views are being formed; the teachers’ words and deeds are imperceptibly influencing students. So teachers should have the right worldview and noble sentiments to shoulder the historical responsibility of educating people and cultivating successors of socialist construction. In 2013, Ministry of Education of the People’s Republic of China issued the document “Secondary Vocational Education Teacher Standard”, which clearly stipulates that vocational school teachers should have a passion for the cause of technical and vocational education, should be dedicated to the teaching cause with strong willingness to pursue the career, should practice the core value system for socialism, and fulfill the teaching ethics and conform to the laws and regulations.

The professional ethics of technical and vocational education teachers includes the professional morals of teachers themselves and professional morals that are required by certain works. The professional morals of teachers themselves have two aspects: The first one is public morality and professional ethics. They are the reflection of socialist spiritual civilization upon teachers and have a great influence on the school’s and the teaching atmosphere. They surely have a positive influence upon each stu-

¹³Wu Xueping (2007). Basis and Application-Study on the Policy of Higher Vocational Education. Hangzhou: Zhejiang Education Press, 34–201.

dent's moral accomplishment. Moral accomplishment refers to dedication to the work and loving the students, pursuing studies meticulously, being scrupulous about every detail, teaching with tireless zeal, being as good as your word, thinking and acting in one and the same way, setting examples for students and being worthy of the name teacher. The second one is devotion to the cause of vocational education. Since technical and vocational education teachers are required to have wide professional majors, their knowledge renews quickly, their working conditions are not satisfactory, and their tasks are tough. So they should have a strong dedication, not pursuing titles and benefits. The third one is group consciousness and mutual cooperation and encouragement. As a professional teacher, they cannot complete the teaching task merely with a book or a piece of chalk. Technical and vocational education is combined to many links like teaching, experiments, practice, production, technologies promotion, and so on. It is fulfilled by many people. So teachers should have the spirit of cooperation and encouragement among themselves.

Professional morals are required to have certain work ethics. The students that vocational high schools cultivate will finally enter the society and work in complicated vocations. This requires that when they are in school, they should receive the training in professional morals/ethics. So professional teachers should have the professional morals of their major; the first one is to have a deep understanding of their major, for example, the major's social status, effect, developing tendency, and so on. The second one is to have the professional morals that are required by their major (industry), and understand the vocational morals/ethics and laws of that industry.

Cultural knowledge quality includes two aspects: Scientific cultural and professional knowledge quality. Scientific cultural quality refers to the width and depth of the required social and cultural knowledge, as well as the scientific knowledge of teachers in their normal social and economic life. The teacher's professional characteristic decides that teachers should have a wide social cultural knowledge and scientific knowledge. First, contacting society in a complicated educational system, teachers should have this quality; secondly, besides fulfilling the teaching tasks, having high scientific cultural quality, teachers can enlarge their scale of educational activities by opening classes, like drawing, photography, music and entertainments, and so on. Contacting with students in various activities, teachers can educate and guide them, become their good teachers, and helpful friends; thirdly, having a high scientific cultural quality can strengthen the teachers' ability of transforming their majors.

Professional knowledge quality refers to the width and depth of teachers' basic theoretical knowledge. Professional knowledge is the key to technical and vocational education classroom teaching success. It requires teachers to have a wide and sound basic theoretical knowledge. Besides a good command of the subject they teach, they should have some related knowledge, for example teachers of engineering should be proficient in teaching engineering theories, engineering drawing, tolerance, metalworking, and other subjects. When a subject or an academic major with some

new knowledge, experience, or technology appears, then this requires teachers to learn about the new contents and the tendency of the subject's future development¹⁴ (Du 2005).

The task of vocational school teachers is to cultivate talents that are useful for the building of the nation. Graduates of vocational schools should have certain theoretical basis and ability to solve problems in production. Teachers should not only have qualities meant for general schools, but also some specific vocational qualities and skills. These vocational qualities include: (1) Teachers should be qualified to work in some regular engineering practical posts. Teachers of vocational schools should have a certain theoretical level to fulfill their teaching tasks; further, they should be good at applying theories and solving the real problems at the project site. (2) Teachers should have strong engineering practical adaptation ability. Most of the working time of vocational school teachers is spent at school, whereas the graduates of vocational schools go to work in the frontline of enterprises/industry. In a situation where production technologies tend to develop and change quickly, teachers will be confronted with new technologies, crafts, and equipment, especially while leading students in practice. This requires teachers to absorb new knowledge and information constantly, and have a strong emergency adaptation ability. (3) Teachers should be capable of designing, installing, and debugging equipment and processes. In related documents on strengthening vocational education, it is clearly stipulated that vocational schools should implement scientific research which focuses on the promotion of science and technologies. It is the task of vocational education, to provide services for economic construction. Skills like engineering design, installation, and debugging are valuable assets for technical and vocational education teachers¹⁵ (Liu 2004). In 2009, the Chinese government launched the National Teacher Training Plan (NTTP), the first major national teachers' program promulgated by MoE and the Ministry of Finance (MoF). This program is an important initiative to improve the overall quality of teachers in primary schools, junior middle schools, high schools and vocational secondary schools, especially those from rural primary and secondary schools. Projects under the NTTP include the Project of Exemplary Teacher Training (PETT) and the Project of Rural Key Teacher Training (PRKTT) in central and western China. In 2012, a total of 334,000 teachers participated in the PETT program, and 816,000 teachers were involved in the PRKTT program.

As previously mentioned, the NTTP project also included secondary vocational school teachers' training. In TVET, the program focuses on enhancing teacher skills by encouraging teachers to acquire practical vocational skills through experiences gained in world of work. In 2013, the program (see Table 6.1) trained 14,500 qualified vocational teachers across 37 provinces and core cities (Beijing, Tianjin, Shanghai, Guangzhou, Chongqing). 900 teachers were given the opportunity for overseas training and 9000 teachers, below the age of 35 and with more than two years work

¹⁴Du Jize (2005). *Study on Technical and Vocational Education under Socialism Market-driven Economy*. Beijing: Economic Science Press: 241–259.

¹⁵Liu Hequn (2004). *Vocational Pedagogy*. Guangzhou: Guangdong Higher Education Press: 142–154.

Table 6.1 Faculty with master's degree in technical and vocational colleges (China Education Overview (2011, 2012, 2013 and 2014))

Year/ratio	2011	2012	2013	2014
Percentage (%)	35.4	38	40	42.3

Table 6.2 Faculty with high professional title in technical and vocational colleges (China Education Overview (2011, 2012, 2013 and 2014))

Year/ratio	2011	2012	2013	2014
Percentage (%)	28.9	29.1	29.3	29.4

Table 6.3 Technical and vocational teachers trained under the National Education Teacher Training Project (NTEP) in 2013

Training program	Teachers of higher education	Teachers of secondary school teachers
National training	4500	10,000
Overseas training	500	400
Internships in enterprises	5000	4000

experience, underwent internships in large enterprises to enhance their practical skills (MOE 2013) (Tables 6.2 and 6.3).

Quality technical and vocational education theory refers to the knowledge and skill that can improve the formation and development of teachers' educational and teaching abilities. It also refers to the width and depth of the teacher's command and application of knowledge and skills like psychology, education history, professional textbooks, and teaching methods. The quality of technical and vocational education theory includes two aspects: Basic educational theory and a solid vocational knowledge basis.

Teachers at vocational schools should have a basic quality of educational theory and a sound teaching ability. Vocational schools' teachers should receive at least some educational science theories training including psychology, pedagogy, teaching methods, and so on. In teaching, according to the requirements of the cultivation targets, teaching should apply the necessary educational and teaching skills, explore vocational and technological education rules. It should also improve educational ideas and teaching methods by having good abilities of applying the appropriate textbooks and language expressions. Quality teaching will fulfill the tasks of theoretical teaching and skills training, according to the requirements of the teaching plan and outline; guiding the students' classroom learning and practice, and evaluate students in multiple formats.

Teachers at vocational schools should have a rich scientific culture and knowledge of professional technology, a wide thirst for knowledge, a good understanding of the latest achievements of their academic major and subject material; and the ability to apply the latest scientific knowledge to teaching. Besides, teachers should have a fair grasp of the social sciences to enrich their general knowledge.

Quality of science promotion refers to promoting scientific research and the promotion of applicable technologies. The vitality of vocational schools lies in closely relating to the local reality of trying to improve the local economy and becoming a center for promoting science and a resource for science and technology consultations. This requires teachers to understand the current situation of local economic development, production resources, and human resource structures. The teachers should be able to do research, and promote new technologies according to the local economic reality. This also requires teachers to have the willingness to learn about new technologies that are related to the local economy. Teaching these traits to students and promoting them through the teaching system is the role of the teachers. And this requires the teachers to be skilled at scientific research and have the spirit of hard work.

The quality of social communication of technical and vocational education teachers refers to the width and depth of communication between teachers and people in different circles. Vocational schools are not so closed as general schools; the existence, consolidation, and development of vocational schools are closely related to the society; a closed teaching mode will lead vocational schools to their extinction. So vocational schools should be in communication with the various parts in the society. Teachers are required to have sound social communication skills. With regard to determining the majors to be taught, teachers should do a social survey and research the demographics, and communicate with related persons; as to the school's development, teachers should understand the knowledge structure and major environment of the society in view of the talents being developed; as to teaching, teachers should explore possibilities outside of the schools, combine theory and practice, popularize science and technology, and provide service for the local industrial production needs. As to scientific research, teachers should do research in subjects related to local developments, and so on. All these require that teachers communicate with the society; so they need to have good communication skills.¹⁶ (Du 2005).

6.2.2.2 Required Abilities of Technical and Vocational Teachers

The abilities required of technical and vocational education teachers include: The ability of understanding and educating students, teaching ability, learning ability, and interest in science and technology, and so on.

Teachers' ability for understanding and educating students is reflected on the following two aspects: (1) Inculcate in the students an open mind to form an outlook and worldview, improve the students' consciousness, help the students to form a scientific view of the world and life, and to have a clear political direction and a lofty spiritual view of life. (2) The teachers' ability of understanding and educating students is also reflected in their respect and trust of the students; in other words,

¹⁶Du Jize (2005). Study on Technical and Vocational Education under Socialism Market-driven Economy. Beijing: Economic Science Press: 241–259.

respect the students' human dignity and personality. Respect for students is not only a reflection of the human element in the teacher-student relationship, but is also an important condition to help students grow healthily. Respect comes from trust. Teachers should believe that students can improve themselves through education; teachers should understand that young people, like all other human beings, tend to make mistakes; nobody is perfect, the teachers' efforts should be directed to guiding them, to correct their mistakes; they should believe that students can grow healthily with education.

The teaching ability of technical and vocational education teachers is mainly reflected in their teaching activities. Teachers' teaching activities are the direct reflection of the teachers' teaching levels. A teacher who is serious about teaching transmits his/her responsible working style and lofty qualities to their students through their words and actions. The teachers' teaching ability can be divided into two parts: Language expression ability and teaching organization ability.

Using scientific and standard teaching language is the most basic requirement for a qualified teacher when communicating their lessons to their students. First, the notions or concepts of things should be clear and correct. Teachers use concepts to explain things in the teaching process. Many basic concepts can be "transplanted" into the students' knowledge storage through the teachers' explanation. Secondly, the terms should be correct and standardized. When teaching professional courses, the teachers' proficient and standard use of terms is beneficial for the students' command of the related language and of the professional knowledge. Thirdly, the content of language expression should be complete. Each class has a certain teaching target, within this target, teachers should have a certain complete and systematic content; they should explain the scientific concepts precisely. Teachers should design the teaching language of each class—how to begin, how to analyze, conclude, explain, and how to raise questions, all of these should be carefully planned and organized. Finally, teachers should grasp the language of teaching; this requires teachers to be clear in teaching and good at expressing; the logic of thinking should be reflected in the logic of the language. The language should be loud, clear, and active; use Chinese Mandarin when appropriate, for example, in China.

The organization and management of teaching is both a science and an art. The teaching organization and management ability of vocational school teachers is reflected, first of all, in the teachers' preparation for the class, including a written lesson plan. Teachers should prepare the classes seriously and carefully; besides studying the lesson plan and textbooks, the teachers should also understand the teaching aims, requirements and difficulties; and find out the ways and methods of achieving the teaching aims. In the second place, the teachers should organize strictly the classroom teaching process. A good class depends on the teacher's careful design and arrangement. Teachers should explain the profound in simple terms, explore the nature of the teaching content, and grasp the key points of the teaching content. Thirdly, teachers should create an active classroom atmosphere. It is an important condition to have a good teaching effect. Besides, teachers should deal with the emergencies properly. Teachers should compile the exercises carefully, correct homework, provide extracurricular guidance and evaluate the teaching effect.

Teachers of vocational schools should insist on implementing in-service training in multi modes; learning while working is an important experience for teachers; it encourages self-study which stimulates their intellectual growth. Knowledge is multiplying at an unimaginable speed today; to keep abreast of the knowledge explosion, people would have to change their traditional attitudes of receiving education. The old models cannot keep pace with today's information boom. Currently, with the development of modern distance education, learning is becoming a life-long process and teachers should be the first to make use of it. In order to finish the work of teaching and education well, and to constantly improve the quality of their teaching, teachers should closely combine working and learning.

Scientific research activities are important activities of teachers. Scientific research activities of vocational schools are mainly activities of teaching research, teaching reform, popularization of new technologies, technology renovation, and so on. Vocational schools should have some scientific research key teachers, which may consist of full-time and part-time teachers. This scientific research staff is an important force of vocational and technological education research. The success and failure of teachers' teaching research, teaching reform and scientific research activities will directly influence the development of technical and vocational education and the advancement of science and technology.

To encourage technical and vocational education teachers to get involved in teaching research, reform, and scientific research activities, management departments should guide, organize and arrange teachers' activities. They should not only arrange the teachers' subjects of teaching research, teaching reform and scientific research, but also ensure that the teachers fulfill their targets.

In order to improve teachers' ability of teaching research, teaching reform and scientific research, teachers' spirit of exploration and creativity should be cultivated. Teachers should not only do scientific research, but should also have the ability of concluding, accumulating and applying scientific knowledge. The work of teaching research, reform, and scientific research is a process in which teachers accumulate and develop scientific knowledge¹⁷ (Liu 2004).

6.3 Professional Development of Technical and Vocational Education Teaching Faculty

6.3.1 Professionalism of Teaching Faculty

The professional development of technical and vocational education teachers refers to the teachers' professional career, relying on professional organizations; through life-long professional training teachers acquire professional knowledge and skills. It

¹⁷Liu Hequn (2004). Vocational Pedagogy. Guangzhou: Guangdong Higher Education Press: 142–154.

is the teachers' growing process of showing professional morals, improving qualities, and becoming qualified educators. According to the history of international teachers' professional development, this development of technical and vocational education teachers in China is at an early stage.

For technical and vocational education teachers, becoming professional is a process of improving their education and bringing it in line with the professional standards of their vocation. Through certain measures and means, technical and vocational education teachers turn from being non-professional into professional personnel. Generally speaking, it includes the following basic content.

Teachers should not only have the related vocational professional knowledge and skills, but also those specific to educational activities, which includes related knowledge like the psychology of pedagogy. Teachers should be able to encourage each student to develop their own personalities, to be ready to enter society and obtain employment in their chosen vocational. This kind of service is a professional service.

In order to be qualified in current vocational education, teachers should implement relative research. By participating in academic research, teachers can sharpen their vocational and educational abilities. Technical and vocational education teachers should study students, teaching, and their own development. Studying students means studying their psychological and personality traits, current level of knowledge and abilities, employment trends, and developing potential. With this in-depth knowledge, the teacher can provide effective guidance for their students. Studying teaching is to study the teaching content and teaching methods. In modern vocational education, teaching activities should center on the students. What is more, teachers should also strengthen the connection with enterprises/industry to enrich the teaching content. By revising teaching methods, teachers can make the learning process become a process in which students can take an active part. This improves the students' abilities of vocational development. Studying their own development is to take a view of the teachers' past and present; experience learnt from others and all the methods and knowledge that are used currently. As teaching is a professional vocation, a teacher should not be just only a "pedagogue". Technical and vocational education teachers should explore constantly and become experts in certain fields.

The professionalism of vocational education, which develops constantly, is a growing process in which teachers acquire educational skills through life-long professional training. Teachers' professional growth lies in the teachers' development. This kind of professional growth is a life-long learning process, a process of constantly solving problems, and a process in which the teachers' vocational dreams, morals, sentiments, and social responsibilities become mature¹⁸ (Li and Cui 2004).

More precisely, professionalism includes three aspects: Professionalism of technical and vocational education teachers, socialization of technical and vocational education teachers, and systematization of technical and vocational education teachers' management and training.

¹⁸Li Yuqiu, Cui Yanping (2004). Analysis on the Professional Development of Vocational Education Teachers. *Chinese Vocational and Technical Education*, (20):39–40.

6.3.1.1 Professionalism of Technical and Vocational Education Teachers

On the basis of analyzing the profession of technical and vocational education teachers, we should find out the exact content of the vocational activities of these teachers. Then we should highlight the necessary professional knowledge and abilities that are required to fulfill their vocational activities, and correct their improvement and training targets. We should make the contents of these cultivation and training targets specific. Besides, we should adjust teaching time, adapt teaching methods which have technical and vocational education characteristics, and emphasize the cultivation of “dual-competency” qualities, so that technical and vocational education teachers will be in a reasonable vocational environment.

Secondly, implement vocational control over the profession of technical and vocational education teachers. Through designing, issuing, and implementing teachers’ vocational standards, we can implement vocational control. With teachers’ vocational standards, the departments of technical and vocational education can select and engage excellent technical and vocational education personnel, re-examine the qualification of current technical and vocational education teachers and guide them in the direction of their professional development.

6.3.1.2 Socialization of Technical and Vocational Education Teachers

First, the socialization of selecting technical and vocational education teachers will be considered. The process of technical and vocational education teachers’ socialization is to have these teachers to become professional personnel who cannot easily be replaced. This requires strict limitations to the teachers’ enrollment. The nation should issue a technical and vocational education teacher qualification certificate which shows the technical and vocational education teachers’ professional standards. Since technical and vocational education is socialized, technical and vocational education mainly relies on the co-running of industries, enterprises, institutes, and social departments; we should emphasize the combination of education and production. Technical and vocational education is a kind of education closely related to social production and economic construction. The running of technical and vocational education should adapt to the nation’s social development. So when selecting teachers, on the one hand, we should insist on working with certificates and constructing the perfect technical and vocational education teachers’ qualification examination system. On the other hand, we should engage full-time and part-time personnel who understand the technologies, and can move from working in enterprises into being part of a technical and vocational education teaching staff. Technical and vocational education teachers should be selected from society with an emphasis on professional abilities and practical skills. This is beneficial for the formation of technical and vocational education professional qualities; it is in fact a process of developing the technical and vocational education teacher’s professionalism.

Secondly, the socialization of technical and vocational education teachers' vocational characteristics is to be considered. As one of the educational forms, which have the closest relationship with economic development, the social communication range of technical and vocational education teachers needs to be much wider. Technical and vocational education teachers should be able to communicate with industries, departments, institutes, and the students' employment departments. This kind of communication ability of technical and vocational education teachers decides the success or failure of their teaching. The socialization of technical and vocational education teachers' vocational characteristics is an effective way of realizing their professionalism.

6.3.1.3 Systematization of Technical and Vocational Education Teachers' Management and Training

In the authentication system of technical and vocational education teachers' qualifications, the national and educational administrative departments should have developed vocational standards for enrolling technical and vocational education teachers along with establishing a qualification authentication system to support them. The qualification authentication and title assessment of theory teachers are mainly managed by educational departments, while the qualification authentication of professionals, researchers, and training teachers is decided by the related experts of their respective labor departments. Thus on the one hand, we can assure and improve the quality of technical and vocational education teachers by regulating, adjusting, and improving the cultivation and construction of the technical and vocational education teaching faculty. On the other hand, to improve the admittance requirements to the technical and vocational education professional would improve its social status. The process is in fact a process of improving the professionalism of technical and vocational education teachers.

As to the technical and vocational education teachers training and further education, we should establish special institutes for this specific purpose. We should complete the system of technical and vocational education training, and further education, by creating a good environment for their development. The environment includes: The creation and guarantee of opportunities and conditions for pre-service and in-service education of technical and vocational education teachers; regulating the various systems of their cultivation and development; promotion of teachers' professional skills and knowledge. The professional system of training and further education will greatly improve the teachers' professional qualities and push forward the professionalism process¹⁹ (Shao and Liu 2008).

¹⁹Shao Aiqun, Liu Yang (2008). Thinking about Connotation of the Vocational Education Teachers' Specialization. *Adult Education* (2): 52–53.

6.3.2 Reflection on Professional Development of Teaching Faculty

Establishing a technical and vocational education teaching faculty, which has high quality and characteristics, is the key to developing vocational education, and it is an important strategic task of vocational and technological colleges. The quality of teachers decides a schools' teaching and overall quality. It reflects the academic status and comprehensive strength of the schools. The lack of strict teacher assessment in technical and vocational education creates the gap between the quality of some schools' teachers and the technical and vocational education requirements. In order to improve the quality of the vocational schools' teaching faculties, on the basis of learning from foreign experience and combining the reality in China, it is necessary to reform the teachers' pre-service cultivation and in-service training system to improve the professionalism of technical and vocational education teachers.

6.3.2.1 Design Teaching Faculty Construction Plan

A plan is the guide designed according to the reality and a developmental prediction. A scientific teachers' construction plan can guide the teaching staff to develop healthily without individual interference. The key of planning is the cultivation of "dual-competency" teachers. Generally speaking, teachers of science and engineering majors should have an academic background of an undergraduate degree, or higher, and get familiar with the situation of industries, products, and production. Teachers of basic courses should understand the embodiment and application of the basic theories in their major, and can implement teaching them with a connection to the reality found in industry. Teachers of professional courses should be familiar with the structural theories, basic characteristics, and production processes of the typical products in their major. They should get familiar with related production equipment and grasp at least one basic operational skill. Teachers of training courses should understand the production process, operational skills, and technology processes, and be able to operate on the frontline. In order to meet the needs of adapting to the fast developing hi-tech applications, teachers of professional and training courses should go to the enterprises/industries to implement the corresponding engineering technology and operational training. According to those requirements and the reality of the current teaching staff, we should design the teachers' training plans, further education and "requirements". According to the overall requirements, and their own situation, each teacher makes his own improvement plan. The plan should also include the enrollment of new teachers. This part can be designed according to the situation of the personnel, schools' development planning, the teachers aging situation, the situation of science and technologies in development, and so on. Meanwhile, we should consider the natural flow of personnel.

We should complete the schools' various systems to improve the implementation of the teaching faculty formation plan. In order to step into a virtuous circle, it is

necessary to design an inner management system, which adapts to the development of vocational education; establish systems of engaging, awarding, and competition to improve the optimization, development, and the using of human resources.

6.3.2.2 Strengthen the Cultivation of “Dual-Competency” Teachers

“Dual-competency” teachers are teachers who have both theoretical and practical abilities. Taking a view of the current teaching ability of technical and vocational education teachers, the quantity of “dual-competency” teachers is still not high enough. Theoretical and practical teaching are still separated; the main reason is that there is a lack of “dual-competency” teaching staff who are qualified in both areas. Analyzing from the current situation of vocational schools, the top priority is to construct a “dual-competency” teaching faculty with the reality of teaching this combination. The cultivation of “dual-competency” teachers can be achieved through the following ways.

First, improve the academic level of technical and vocational education teachers. Our nation should make the overall arrangement, choose some key universities to be the bases of cultivating and training technical and vocational education teachers, and make the corresponding policies to support them. Key universities boast of educational and teaching resources. Cultivating technical and vocational education teachers by key universities can make full use of the universities’ human resources, teaching and research equipment, by bring the national and provincial key subjects and labs into full play. Through enrolling full-time students to study for degrees, technical and vocational education teachers can study for in-service degrees, and receive training and further education in various forms. Surely, universities should design curriculum and teaching plans that emphasize the grasp of applied knowledge and improvement of real education; and teaching abilities according to the characteristics of technical and vocational education teachers. Besides this, strengthen the theoretical training and improvement of academic credentials of practical student teachers. As to teachers who haven’t had an undergraduate academic background, we should create conditions for them to get the required standard academic credentials; as to teachers who have an undergraduate academic background, we should encourage them to study for higher degrees to upgrade their knowledge of theories, technologies, and skills.

Secondly, reform the teachers’ cultivation form. We should explore new teaching methods and talents cultivation forms; emphasize the cultivation and training of vocational abilities, qualities, habits and morals; pay close attention to the relationship between public and professional courses, blur the distinction of teachers of basic and professional courses. The basic courses should provide the service for professional teaching, new teachers should receive pre-service training. Organize teachers to take part in engineering design and social practice. Technical and vocational education teachers should have the corresponding vocational certificates or skills degree certificates. Emphasize the choosing and training of experienced mental and skilled personnel and practical student guiding teachers. Distribute teachers

of theory courses to technical and vocational education teachers' training bases to receive "dual-competency" training; implement practical activities of basic teaching abilities and basic skills. Hold evaluations or competitions to improve the teaching; apply modern educational technologies and methods in teaching, purchase advanced equipment, organize teachers to learn how to use them. In a word, the cultivation of "dual-competency" teachers should combine professional theories and practical teaching. Through teaching reform, becoming "dual-competency" teachers will become the common target of all higher vocational schools' teachers.

Thirdly, invite enterprises to promote the cultivation of technical and vocational education teachers. Running schools with the cooperation of enterprises/industries is the best way to provide teachers the opportunities to practice in the frontline of production, and it is the key point of cultivating "dual-competency" teachers. Through cooperation, teachers can better grasp professional skills. During the process of cooperating with enterprises/industries, teachers have to understand and grasp the production process and labor organizational process. Thus the practical abilities of teachers, especially of young teachers, can be improved, and it is beneficial for them to become "dual-competency" teachers. On the one hand, we can engage engineering and technological personnel who have a rich practical experience and teaching ability into key universities. They can provide lectures on new knowledge, technologies, and management methods found in enterprises. The engagement of part-time teachers can strengthen technical and vocational education teachers' practical ability and replenish the current teaching faculty. On the other hand, we should insist on combining "production, learning, and research" when cultivating "dual-competency" teachers. Providing service to the frontline of production is the basic task of vocational education, and it is also an effective way of guiding teachers to develop in the direction of becoming "dual-competency". Encouraging teachers to develop technologies for the production can not only strengthen the relationship and cooperation with production and research departments, but also create chances and conditions for teachers to improve themselves further. Vocational schools should make full use of the human and educational resources in and out of schools, implement a wide combination of "production, learning, and research", by connecting teaching and production, to emphasize the development of new products and students' training, and form a self-consummating and self-developing system of educational and production processes.

Fourthly, emphasize training and practice. The biggest difference between vocational and general education is that technical and vocational education emphasizes practice and training more than general education. Technical and vocational education pays more attention to the cultivation of students' skills. Technical and vocational education teachers are the implementers of vocational education's cultivation target and the reflectors of technical and vocational education characteristics. They should firstly receive strict training of the professional skills and grasp the operational processes of the training facilities. Key universities can do the following to strengthen the training and practice in vocational training: Strengthen the construction of labs within schools and practice bases outside of the schools, to provide the necessary conditions for training and practice. The experimental and training facilities pro-

vided should conform to the requirements of developing technological talents, and they should be beneficial for students to grasp the latest abilities of applying science and technologies. The training should combine theory and practice, engage a certain quantity of engineers to act as practical student teachers. They should draw regulations to strengthen the training of practical student teachers, and award certificates to those who are qualified in training. The quality of training and practice is an important indicator of the technical and vocational education teachers' cultivation and training; we should pay attention to the system and facilities construction to assure the realization of this indicator.

6.3.2.3 Emphasize the in-Service Improvement of Technical and Vocational Education Teachers

Individual further study is a form which takes the most time in teachers' further education. According to the requirement of the work, teachers enlarge their outlook by reading professional books and journals, taking part in teaching and research activities in and out of school, studying in-service courses, and so on. Meanwhile, they research and improve teaching modes and methods in teaching practice. In addition, vocational schools should take measures to lead teachers to be involved in teaching reform and research so that teachers can improve the teaching and educational work.

As an important part of establishing a teaching faculty, teachers training should adapt to the changes of the environment. Meanwhile, it should try to improve the inner environmental conditions, and adjust the targets and plans of training constantly. Teacher's training can have various modes, levels and forms. Implementing cooperation between schools and enterprises is an important way. Teachers of technical and vocational education should go out and understand the situation of production line workers, accumulate skills, technologies, and practical experience that are required by practical teaching; make perfect the intellectual structure and supplement, and enrich themselves constantly. Vocational schools can organize teachers to engage their skills in service and operational practice, to combine "teaching, production, and skills service" altogether. Encourage teachers of basic theoretical courses to undertake these subjects in related enterprises or institutes, implement research and technology development. Choose teachers to hold part-time jobs in enterprises. They can then introduce the latest achievements of these industrial and technological fields into the classroom. Teachers of professional courses should have experience in engineering and technologies, or they can hardly be qualified in the cultivation of applied talents. Vocational schools can distribute teachers to practice in practical bases or enterprises for a certain period of time to get familiar with the production, and to learn technologies and accumulate experience. Teachers can lead students to practice in bases, they can learn new technologies, equipment, skills, collect materials, enrich teaching, improve their teaching level, and shorten the gap between teaching and reality. Teachers can make use of the spare time to visit or practice in the front line of production. Young teachers have shorter practical working time and less practical

experience. Schools should emphasize the cultivation of those teachers' practical and applicable abilities, create opportunities for them, encourage them to go to the frontline, and solve problems.

Besides training teachers through cooperation between schools and enterprises, we can train technical and vocational education teachers through international educational communications and cooperation. We can invite related experts to give lectures and guidance to technical and vocational education teachers. We can also invite some teachers who love education, have a good command of foreign languages, and a sound professional basis in countries whose technical and vocational education is well developed, to teach in China. We can also learn from the advanced training modes in foreign countries to have them implemented into our various training programs. For example, on the basis of cooperating with Germany, Technical and Vocational Education School of Tongji University draws lessons from the advanced experience of Germany in training vocational education teachers, and develops new majors that meet the needs of modern vocational education. Its aim is to cultivate higher technical and vocational education teachers who have professional knowledge and skills and can meet the needs of 21st century modernization construction. The teaching plans emphasize the training and cultivation of the students' professional skills, and they will arrange for German experts to give the lessons²⁰ (Wu 2007).

To respond to the existing problems of teacher training mentioned above, MoE and MoF have set preferential policies and measures to encourage teachers to attend in-service training and to pursue advanced studies so as to become "dual-competency" teachers. Notably, the Chinese government has been urging teachers to learn through close cooperation with enterprises, so that they can get access to the training base to improve their skills and thereby "master many skills while specializing in one". Teachers are also encouraged to take vocational skills-related qualification exams in order to attain the corresponding credentials. From 2011 to 2015, MoE had selected 450,000 vocational education teachers to attend a range of teacher training programs, based on region, age, service time, subject taught, teaching experience and teaching performance. Of these teachers, 50,000 attended national training lasting for 12 weeks (including 4 weeks of enterprise internship), which covered the topics of professional knowledge and skills, vocational education theory and teaching methods. MoE sent 2000 teachers, selected on the basis of outstanding performance, for 8 weeks of overseas training in order to learn advanced professional teaching methods and course development techniques. In addition, 20,000 vocational secondary school teachers, who under the age of 35, were sent for a six-month enterprise internship, with modern apprenticeship being defined as the main training approach for

²⁰Wu Xueping (2007). *Fundamental and Applicable—Study on Higher Vocational Education Policy*. Hangzhou: Zhejiang Education Press.

young teachers. Training methods employed in the programs include site visits, skills training workshops and topical lectures²¹ (MoE 2013).

In a word, the professional development of vocational education teachers in China should uphold the principle of co-existing of various levels, contents and modes, emphasizing both academic education and non-academic education, and implementing pre-service training and in-service training.

²¹Ministry of Education of the People's Republic of China (2013). Task of 2013 Vocational education teacher competency enhancement project. http://www.moe.gov.cn/business/htmlfiles/moe/s7034/201309/xxgk_158070.html (retrieved 03.02.2014).

Chapter 7

Management of Technical and Vocational Education



In order to realize the target of technical and vocational education, administrators design, organize, coordinate and control the multiple factors like human resources, material resources, financial resources, time, space, information and so on according to the objectives and principles of technical and vocational education so that educational and teaching work can run continuously, steadily, orderly and efficiently¹ (Wu 2007). The aim is to optimize the multiple factors through scientific management.

Horizontally, management of technical and vocational education in China includes two parts: Administrative management and the school management of the technical and vocational colleges. Vertically, it includes management of secondary and higher technical and vocational education. The four parts of the content are mutually supported and interwoven; they are in the same system and constitute the whole content and process of technical and vocational education management.

7.1 Management System of Technical and Vocational Education

7.1.1 History of Management System

Stage 1: The direct and comprehensive management by central departments (1949–1958).

The period extending from the founding of the People's Republic of China in 1949–1958 could be described as the first stage in the development of a management system of technical and vocational education in China. During this period, in order to guarantee the needs of the national economic construction and development,

¹ Wu Xueping (2007). *Fundamental and Applicable—Study on Higher Vocational Education Policy*. Hangzhou: Zhejiang Education Press.

most secondary special schools and technician schools were managed by central departments.

On March 31, 1953, the State Council issued the Indication on Reestablishing and Developing Secondary Technical Education, requiring central and local departments of education and related departments to implement shared management.

It was further emphasized in the Decision of the State Council on Improving Secondary Education (hereinafter referred to as “Decision”) issued on September 26, 1954 that secondary professional schools should implement unified leadership. Central departments were asked to “lead directly the work of secondary professional schools which belonged to the corresponding departments. They were not to be entrusted to departments of lower levels. Financial cadres required by local departments should be cultivated by the central departments”.

As to the leadership relationship of local industrial schools, the Decision stipulated that they are to be led by related provincial and city departments. After the founding of the department which would manage local industry, schools would be directly managed by their corresponding departments. Those departments would design, cultivate and distribute the secondary industrial technological cadres needed by each province and city.

As to secondary agricultural schools and medical schools, since there are quite a number of such schools, where the majors offered are limited, the Decision stipulated that those schools should be managed by provincial and city municipal department of agriculture, forestry, and medicine under the unified leadership of the central department of agriculture and medicine.

The Decision stipulated that the Central Ministry of Higher Education take charge of national secondary professional education. In order to strictly control the requirements of running the school, the Decision stipulated that the running and closing of secondary professional schools should be approved by the State Council through the ministry of Higher Education. The Ministry of Higher Education would also manage technical schools. In 1953, the State Council decided that the Department of Labor would take charge of the technical schools.

This is the stage when the management system of technical and vocational education was basically formed, which is reflected in the following:

Establishment of a management organization for secondary technical and vocational education. The Secondary Technological Education Council which is made up of personnel from the departments of education, would study and solve the problems related to the secondary technical and vocational education.

Clarify the duties of the direct and indirect management of technical and vocational education. The secondary technical and vocational education was managed by central departments; a small number of schools were managed by local departments or by enterprises to which they were entrusted by the corresponding departments.

Clarify the relationship between the technical and vocational education management system and the economic management system.

Stage 2: The leveled management stage of central and local governments (1958–1980).

Because of the real needs of social development and construction, many departments transferred their rights to lower levels; the management of technical and vocational schools did the same. Many schools were transferred to the management of business departments and enterprises of provincial and municipal governments. It was required in the Advice of the State Council on Transferring Higher Vocational and Secondary Technological Schools to Lower Levels issued on April 4, 1954, that most secondary technical schools could be transferred to the management of provincial or municipal governments, except for some schools which would still be managed by their related departments of the central government. On September 19, 1954, it was emphasized in the Indicator of the State Council on Education that “in order to bring the enthusiasm of both the central and local governments into full play, the management rights of all primary, secondary and most higher vocational schools, secondary professional and technical schools had been transferred to the provinces, cities, and other autonomous regions. The management rights of secondary professional and technician schools, which still belonged to the corresponding central departments, would be transferred to the enterprises, factories and farms which are under the direct leadership of the central departments.” According to the above two documents, the Ministry of Education together with the related departments, transferred the management rights of secondary professional and technical schools, managed by central departments, to the provinces, cities, autonomous regions, or factories, and enterprises which were under the direct control of central government.

The guiding thought of “left-leaning” led to the “Great Leap Forward” in 1958. Technical and vocational education within this period quickly overstepped the level of economic development. There was a large quantity of excess graduates from the agricultural and vocational schools. In 1964, the principle of “two educational systems, two working systems” was implemented which led to the rapid increase of part-time schools. During this period, the country implemented the guideline of developing general education and technical and vocational education concurrently; carrying out the two educational systems was undoubtedly the right action to take. But the management system was not made clear; agricultural, vocational and part-time schools were under the direct management of municipal or county education departments. A new model of administration featuring top-down management was developed from the old model of specialized field administration.

Stage 3: The stage of resuming, rationalizing and reforming (1980 to the present).

It was pointed out in the Report of the State Council on Secondary Education Structure Reform which was issued in October, 1980, that, as an important part of education, the structural reform of technical and vocational education should involve input from the considerations of the national economic development plans, labor systems and youth arrangements. The report suggested that the provinces, cities, and other autonomous regions establish leadership groups, by inviting the related departments to participate, and manage the secondary educational structural reform along with those of the technical and vocational educational areas. The report further urged that local areas, especially cities and counties, should combine the adjustments and reformations of the educational structure with that of the economic structure,

thus closely combining the needs of local economic development with those labor employment. It was also asked to promote the developing plan of technical and vocational education to organize the related departments of education, labor, planning, and to arrange the financing to implement them. As to business, all vocational (technical) schools which cultivate technological workers and cadres should be managed by the education department, assisted by the labor department; all vocational (technical) schools which cultivate reserve technicians should be managed by the labor department, assisted by the education department.

The establishment of vocational (technical) schools would be realized in the following manner: Put forward by school-management units, then approved by the higher authorities, and put on record by the local, municipal or higher level education departments. Newly-established agricultural high schools should be approved by the county education department. Converting rural general high schools into agricultural high schools or vocational (technical) schools should be approved by the local education departments. Converting urban general high schools into vocational (technical) schools and vocational high schools should be approved by the municipal Department of Education. The approval procedures for the establishing of technical schools would remain the same. Establishing individual vocational (technical) schools should be approved by the labor department and the education department.

In January 1981, it was pointed out in the Report on Situation of Secondary Education Structure Reform and Guidance for Future Work that structural reform of secondary education was a comprehensive work which involved the Departments of Labor, Planning, Finance and Economy. Leaders of all levels should consider it as an important task and list it in their agendas. The report suggested establishing a joint conference of secondary education structural reform in which the departments of family planning, education, labor, finance, and agriculture participated. The Departments of Education and Labor would take charge of the daily work. When there arises problems, the joint conference would be opened to solve them. The head of the Culture and Education Department of the provincial government took charge of convening the joint conference and undertook the related work.

In July 1986, at the convention of the first National Technical and Vocational education Conference, it was pointed out that the formation of technical and vocational education was beneficial to local planning and that it aroused the departments' enthusiasm so that schools will have enough self-management rights. But it lacked detailed measures, the management system reform was still in a situation of adjusting and could not keep up with the steps of the economic system's reformation; the system of the "old model" division still existed in real management.

It was pointed out in the Decision of the State Council on Vigorously Developing Technical and Vocational Education issued in 1991, that "governments of all levels and the related departments should take charge of technical and vocational education." The Ministry of Education would take charge of macro-management. The Decision pointed out clearly that "the main responsibility of developing technical and vocational education lies in local areas, especially in the cities and countries." This Decision, in fact, establishes the key status of municipal governments in managing technical and vocational education, and it devised the outline of the technical

and vocational education management system under the unified guidelines of the central government. The document also stipulated the content of local planning and the relationship between departments. During this stage, the reform of the technical and vocational education management system has basically formed by the development mode of the local planning unit, but it had not broken the framework of the “old model” division and hadn’t formed a real local planning unit.

7.1.2 Current Situation of Management System

The educational administration in China is constructed as a system under the centralized leadership of the central government with a leveled form of governance. In the practice, the development of vocational education is planned by the central government, organized and managed by the regional governments with involvement of social parties. The MoE takes charge of planning, coordinating and macro management. The MoHRSS and other ministries are responsible for vocational education issues within their responsibilities. Provinces (autonomous regions, municipalities and relative departments) drawn up and issued policies for different regions and sectors. It is a system that combines the central and local government’s educational administrations under the guidance of the central policy. There is a superior-inferior relationship between central educational administration and the local education administration. At the same time, as educational institutes, the Ministry of Education, provincial Department of Education, and local Department of Education are united; there also exists the same hierarchical relationship among those departments.

The current management system of technical and vocational education in China has the following characteristics: Considering the administrative subordination relationship of governments as the main body, departments at all levels including education, labor, business, and enterprises should establish special technical and vocational education managing institutes. Technical and vocational schools of all levels and types, should be managed directly by departments to which the schools belong. Each management level considers the different types of technical and vocational schools as its managing objective, and establishes two juxtaposed indirect management institutes to manage the school administration departments and the schools themselves.

The right of macro policy-making in the area of technical and vocational education belongs to the central government. National departments of education, labor, planning and finance make decision about implemental working policies, laws, guidelines and planning. The management of educational departments (Ministry of Education) is mainly reflected in macro aspects, for example, the development plan of vocational education, school-running policy, cultivation target and developing direction, the cognizance, evaluation and management of demonstrative schools and colleges. MoE manages vocational schools and colleges indirectly through provincial department of education.

As a centralized governed country, the autonomy of provincial vocational education administration is not stark. Although in recent years, some competences of education administration is transferring from central to local departments, the major policies concerning vocational education are still made by the MoE and the MoHRSS.

As the central leading institute of education, the Ministry of Education entrusts the Department of Higher Education and the Department of Vocational and Adult Education to exercise their corresponding duties of macro-management. Higher technical and vocational education belongs to a diploma based educational system which is under the management of the Department of Higher Education; while secondary technical and vocational education and training is under the management of the Department of Vocational and Adult Education. Provincial and municipal higher technical and vocational education belongs to a diploma based educational system which is under the management of the Department of Higher Education of the Provincial Education Department. Secondary technical and vocational education and training is under the management of the Department of Vocational and Adult Education of the Provincial Education Department. The management of educational departments is mainly reflected in macro aspects—for example, the management of the whole developmental scale and the rate of expansion for technical and vocational schools, the management of technical and vocational schools' administrative system, the cultivation of their targets; and developing the direction, the cognizance, evaluation and management of demonstrative technical and vocational schools, and the national key technical and vocational schools. The management of technical schools, secondary vocational schools, and higher vocational colleges, run by the Department of Labor and other departments, is mainly reflected in the administration's approval of the enrollment plan approval as well as the evaluation and cognizance of the schools' administrative level. In addition, the Ministry of Education manages various technical and vocational schools indirectly through the provincial (municipal) Department of Education.

The Ministry of Human Resources and Social Security (MoHRSS) is another important functional department managing technical and vocational education. Its management towards vocational education includes the macro administration of cultivating targets, developing direction, rate and scale of technical schools and higher technical schools expansion, occupational certificate system especially occupation classification and examination, of skilled worker schools; of vocational training like job-preparation training and re-employment training, the management of various skills evaluation.

The management by other national departments of technical and vocational education is mainly limited to technical and vocational colleges and technical and vocational training, which are within the various industries. Currently, technical and vocational schools, which belong to the different national departments, are transferring their managing rights to the provinces and cities. In the future, the management of the national departments toward technical and vocational education will be mainly focused on various vocational training programs.

Provincial management institutes of technical and vocational education mainly refers to the vocational and adult education of the provincial (municipal) Depart-

ment of Education and the vocational and skills development refers to the provincial Department of Labor. Since China implements the central management system in education, the autonomy of provincial education management is not as powerful as it is in countries with a decentralized management system. Although in recent years, the autonomy of education management is transferring to local departments; the major policies concerning technical and vocational education management are still made by the Ministry of Education and the Ministry of Human Resources and Social Security.

The management of technical and vocational schools is shouldered by the local vocational and adult educational and the vocational skills developments within the local governmental departments. Management of this level's technical and vocational education has two functions: One is the substantive management of the schools affiliated to this department, and another one is the planning and guidance of schools established by the counties. Viewing the reality of our country's technical and vocational education management, it is necessary to establish a municipal (local) planned management system for technical and vocational education. Municipal (local) management belongs to middle management level; it is the connection between macro-management and micro-management; it is the key level of administrative management in China, and the governments at this level gives most of the local characteristics to the educational system. After the reformation of the system, the cities gained management control from the counties in managing of local technical and vocational education. This gives local governments the macro-control they need and the advantages of being closer to the reality of understanding the true local situation. Especially in the area of economic development, cities have the advantages of understanding the needs of the local economy in regards to the needs of technical and vocational education. Analyzing the current situation of the technical and vocational educational administration and management systems, we may find that most technical and vocational schools are established and managed by municipal governments alone or by municipal and county governments joining together; cities become the most direct managing institutes of these schools. Any decisions and arrangements related to the development of education should be implemented by the cities; the major problems that exist during the administrative process can be solved and supported locally. So implementing local planning is not only beneficial to the overall management, but it can also arouse the enthusiasm of enterprises, social groups, and industries that aid in running/benefit from the schools. It conforms to the developing rule of technical and vocational education and can make full use of the educational resources² (Liu and Xu 2002).

²Liu Chunsheng, Xu Changfa (2002). *Vocational Pedagogy*. Beijing: Education Science Publishing House: 397–401.

7.2 School Management of Technical and Vocational Education

7.2.1 Management System of Vocational Schools

The management system or leadership system of technical and vocational schools is the general name for the organizational system and its policies for the vocational schools' inner institute arrangement, leaders' authority division, and membership relation. The division of leadership is the central content of the leadership system. The school leadership system is the basic organization system for the running of school organizations. Since the founding of the People's Republic of China, the secondary technical and vocational schools were established mainly to include the following forms: elementary vocational school, high vocational school, and the secondary vocational school and technical school. The inner leadership system of secondary technical and vocational school is the same as that of the primary and high school; they have experienced several leadership systems. Objectively speaking, different leadership management systems have had differing positive effects on the developing history of technical and vocational education, but they also have had certain limitations and shortages.

7.2.1.1 Current Inner Management System of Secondary Technical and Vocational Schools

Since the founding of the People's Republic of China, the inner management system of secondary technical and vocational schools has experienced several changes, from the system of the school affairs council to the Principal Responsibility System. Taking a wide view of the leadership system's evolution process, we find that the changing forms of the leadership system are various and are influenced by multiple factors, viewed from the angle of pure school leadership and management.

The schools' leadership system directly decides the schools' running efficiency, the complete Principal Responsibility System was first conceived in 1950. It was pointed out in the Decision of the CPC on Reforming Educational System, issued on May 29, 1985, that "schools should implement a Principal Responsibility System", and it was clearly pointed out in the Outline of Chinese Education Reform and Development, issued on February 13, 1993, that "primary and secondary schools implement a Principal Responsibility System." Obviously, it was the top regulation of the secondary schools' inner leadership system. In 1995, it was stipulated in the Education Law of the People's Republic of China that "principals should take charge of the schools' teaching and other administrative management." This provided a lawful guarantee for the implementation of the Principal Responsibility System. Since various secondary technical and vocational schools are included in "primary and secondary schools", the "Principal Responsibility System" is at work in the current leadership system of these secondary technical and vocational schools in China.

According to the above spirit, the meaning of the Principal Responsibility System, which is run in various technical and vocational schools, is that the principals lead and take charge of school education, teaching, recognition and finance, they exercise the decision-making right as schools' administrative keys. The Party organization exerts supervision and guarantee, and the delegation of faculty involved in the management democratically. As an administrative system, the Principal Responsibility System will not be limited in the principal's duties. It also includes a corresponding division of functions at different levels: As the principals are the legal representatives of the school, they shoulder part of the schools' management duties; they lead and take charge of the schools' education, teaching, recognition, and finance; they exercise the decision-making right as schools' administrative keys and top leaders; the Party organization has the right of supervising and suggesting to school's administrative activities. As the delegation of the whole faculty, the faculty delegation conference takes part in the democratic management and supervision of the schools' major affairs under the leadership of the Party. In the relationship among the three bodies, the principal is the key person; the three bodies support and restrict each other, and form an organic system.

The decades practice has proven that the implementation of the Principal Responsibility System in primary and secondary schools is an effective leadership system, it reflects the advantages of section-chief-rank organizations in schools' management. It straightens out the Party-government relationship and brings the effort of the administrative leaders into full play. At the same time, it arouses faculty's enthusiasm in taking part in the schools' management and improves the schools' administrative efficiency and quality of school education. The Principal Responsibility System is an effective leadership system; it can fully reflect the advantages of section-chief-rank organizations in the schools' management, especially the efficiency of organizational rights. It plays an important role in resolving the disadvantages of the management in the non-distinction between the Party and the government, the replacement of the government with the Party and the problems of the distinction of their duties. The Principal Responsibility System is a system of elite management; with the implementation of it, those leaders who have genius and courage, understand education and management are selected and appointed. It allows them to realize their administrative ideas, improve the administrations level of leadership, and endow schools with these characteristics by implementing a series of management measures. The Principal Responsibility System is a leadership system which is beneficial to the schools' reformation; it enables a number of principals to apply rights lawfully; they can reform schools affairs, including the use of cadres, work evaluation, engagement of faculty, teaching reform, management of scientific research, encouraging teachers, running the administration, construction of systems and work-study programs. The success of the secondary technical and vocational educational system is due to the implementation of the Principal Responsibility System. Surely, there will appear different degrees of deviation during the ongoing running of the process; the problems still exist on how to bring the democratic supervision of faculty into full play.

7.2.1.2 The Current Inner Management System of Higher Vocational Schools

There are various forms of higher technical and vocational education institutions such as the technical and vocational colleges, higher vocational schools, worker's universities, colleges of adult education, and the radio & TV university. Since these schools belong to the system of higher education in a broad sense, their inner management system surely changes with the changes of the inner management system of the higher schools. Due to the specialty of the higher schools, there is a close relationship between the change of the inner management system of the higher schools and the change of the Chinese political system. A basic leadership principle of the management of Chinese higher vocational education is the "rector responsibility under the leadership of Party committee, combining collective leader and division of individual responsibilities". The leadership of the Party committee is mainly in ideology, politics and organization. The Party committee assumes the overall situation, coordinate all parties, and unified leads school's affairs. As the legal representative of a higher education institution, rector takes charge of the teaching, research and other administrative management, hosts in designing, implementing and valuation of all developing, working and budget plan. The key of carrying out this leadership principle lies in how to deal with the relationship between the Party committee and administrative departments. Rectors' rights as the legal representatives of colleges must be respected, they exert the functions of organizing, implementing and evaluating; as the leading group, the Party committees should support and guarantee rectors' management³ (Du et al. 2007).

Since the founding of the People's Republic of China, the inner management system of higher schools has experienced multiple forms: School affairs council system, Principal Responsibility System, school affairs council responsibility system under the leader of the Party, and so on. Till 1989, the Principal Responsibility System became the unified leadership system adopted in various higher schools. It was clearly stipulated in the Working Regulation of the CPC on Basic Organizations of Higher schools that "higher schools carry out the Principal Responsibility System under the leader of the Party committee." The Party committee keeps the school affairs unified, supports the principal to develop the work, and assure the fulfillment of various tasks including teaching, scientific research, and administrative management. It was stipulated in the Education Law of the People's Republic of China issued on March 18, 1996, that "higher schools carry out the Principal Responsibility System under the leadership of the basic council of higher schools. The basic council of CPC higher schools leads the schools affairs and supports the principal to carry out duties according to the stipulation of Constitutions of Chinese Communist Party".

Such regulations show the characteristics of the inner management system of the Chinese higher schools; they also show the characteristics of the management system of the Chinese higher vocational colleges. The Principal Responsibility System

³Du Yide, Yao Yuanfeng, Li Xingdong (2007). Discussion on Adult Education Development. Beijing: China Remin University Press.

under the leadership of the Party committee is a kind of leadership system combining collective leadership and the division of individual responsibilities. Collective leadership and the division of individual responsibilities is an organic unity which is both different and interdependent. The unity is reflected as the unity of agreement with management targets, decisions in thoughts, working arrangements and the working pace. Their differences lie in this: Collective leadership is for the major problems, which means that the decision-making rights, in the face of major problems, belongs to the Party committee; division of individual responsibility is to the collective decision-making, which means that the content of the collective decision-making will be implemented by an individual according to the duties of different members in the leaders group.

As the leading key factor of a school, the Party committee assumes the overall responsibility, coordinates every party, and leads school's affairs in a unified manner. The leadership of the Party committee is mainly in ideology, politics, and organization. As the legal representative of a higher school, the principal takes charge of the teaching, scientific research, and other administrative management. To be specific, the nature of the Principal Responsibility System is that the principal as well as the administrative system, in which the principal is responsible to the Party committee, are also responsible for the implementation of related policies and regulations. They are responsible for the common and basic interests of faculty for running the school well⁴ (Yang 2005). The Principal should carefully carry out the decisions of the Party committee, and take charge of the organization and implementation of school's teaching, scientific research, administration, logistics, and so on. According to the national plan and local reality, the principal should host in designing the school development plan, the school's annual working plan, annual financial budget, and fundamental construction plan to ensure the fulfillment of the national personnel cultivation plan and the scientific research task. According to the national regulations, the principal should arrange the plans of important institutes and subjects, designing reform plans and designing and correcting the school's various regulations and rules. According to the overall compilation regulated by organs at higher levels, the principal should take initiative in designing the personnel compilation plan for each school department, awarding degrees, evaluating and engaging the professional and skills titles, for personnel of scientific research and management. The principal is also responsible for strengthening the construction of the teaching personnel, administrative and logistics management for the cadres personnel, taking charge of their further education and training, and leading the whole faculty to carry out educational reform. He is in charge of improving the management level of teaching, scientific research, and logistics, and in improving the education and teaching quality; taking charge of the students' overall development; through the management of teaching, scientific research, administration and logistics, exerting the teachers' guiding role in the educating of students in teaching, managing, servicing and educating students in environment. In addition he is responsible for designing plans for enrollment and

⁴Yang Bo (2005). Study on then Inner Operating Management Mechanism of Higher Vocation. Education Exploration (5): 36–37.

graduating employment; hosting foreign affairs, carrying out external academic communication and scientific research cooperation according to the related regulations⁵ (Du et al. 2007).

The Party committee must support the principal in exerting the above authorities rather than taking on an active role in the exact affairs; the principal must respect the decisions of the Party committee on the school's major problems and important affairs. Meanwhile, he/she has to carry out the leadership system in which the Party committee leads the school, implement and perfect the system of combining collative leadership and the division of individual responsibilities. He is also to be involved in the establishing and perfecting of the democratic and scientific decision-making system. Implementing the Principal Responsibility System is beneficial to bringing the leaders' talents into full play, under the leader's unified guidance and coordination. This kind of administrative system illustrates the division of functions between the Party committee and the principal, and avoids replacing the government with the Party. The school's Party organization can be extricated from the onerous task of doing everything as in the past; they can strengthen the faculty's ideology, support supervision, assure the implementation of policies, and the realization of the national education plans.

Undoubtedly, the current Principal Responsibility System, under the leadership of the Party committee in higher schools has certain historical background and reasons for its current format. It is the real-life reflection that conforms to the Chinese situation. It can be predicted that this kind of management system will be the basic leadership system in Chinese higher schools (including higher vocational schools) for a long time in the future. From the reality, how to bring the effect of the combination system of collective leadership and the "single head" system into full play is an important subject for higher education management system reform. The key of carrying out this leadership system lies in how one deals with the relationship between the Party committee and the administrative departments under the new situation. On the one hand, we must make clear that the Party committee is the main predominate key in higher schools' leading. They exert the functions of assuming the overall situation, keeping the picture of the developing direction, making the final decisions on major affairs, coordinating the interests of different parties, and leading the schools' principals. As important members of the Party committee, principals play important roles in the collective leadership. On the other hand, the principals' rights as the legal representatives of the schools must be respected; they carry out the functions of organizing and implementing the teaching, scientific research, social service, and so on. As the leading group, the Party committees should support and guarantee the principals' management. Through mutual coordination and support between "the leadership of the Party committee" and the "principal charging" to assure the efficiency of schools' systematic functions.

⁵Du Yide, Yao Yuanfeng, Li Xingdong (2007). Discussion on Adult Education Development. Beijing: China Remin University Press.

7.2.2 *Management Mode of Vocational Schools*

There are certain differences between the above technical and vocational schools in the areas of their cultivation/improvement targets, administration modes, number of years of study, and learning modes, so their management modes are also different. The following is a brief introduction of the management of technical and vocational schools.

7.2.2.1 **Institutes and Functions of the Vocational Schools' Management**

There must be certain organizational institutes to assure the normal running of schools. Currently, there are four types of the arrangement modes for the vocational schools' management institutes⁶ (Zhou et al. 1992).

The linear structure mode. It refers to all the functions of commanding and managing which should be directly carried out by leaders at school level. There will be two levels rather than the functional organizations: One is leaders and management, the other is implementation. Its characteristic is that in reality, all functions of organizing and managing are shouldered by the principal. It is the level of management that we are familiar with. Currently, some elementary vocational, high vocational and secondary schools of small scale and with fewer students adopt this system. Its advantages are that the institutes are rightsizing, the orders are unified, the commands are in time, the responsibilities are clear, the implementation force is strong and the reflective supervision is in time and correct. Surely, it has obvious disadvantages, for example, the task of the principals is over-weighted; they have to get familiar with everything in the school and deal with everything personally; as a result, they find no time to consider the major affairs of schools.

The function-oriented structure mode. The management of large technical and vocational schools is complicated. It is hard for a principal to deal with everything. So it is necessary to establish corresponding functional departments. The principal entrusts to those functional departments the task of dealing with professional guiding affairs; the functional departments have the right to give orders and indicators within the stipulated business range. Since they have certain rights of commanding, it is called the functional oriented system. This kind of structure divides the school's administrative and business system into three levels: Leading, management, and implementation. Its advantages are that it can decrease the commanding tasks of principal, thus the principal will have enough time to do investigation and research, and make decisions, which is beneficial to school's development. While the disadvantages are that it is easy to find a situation in which there are several leaders doing the same task differently. The orders are not unified and there will arouse some unnecessary contradictions. Currently, secondary and high vocational schools of larger scale adopt this system.

⁶Zou Tianxing, Liu Chunsheng, Ji Zhixin (1992). Vocational and Technical Pedagogy. Beijing: Education Science Publishing House.

The linear and function-oriented structure mode. It is a new management system which combines the linear system and the function-oriented system. Schools arrange different professional departments according to the different subjects. At the same time, functional departments (offices) are established. The managing personnel consist of two types: (1) Linear commanding personnel, for example, the principal, division chief, sectional chief, director and so on. They take charge of the administrative affairs. They give orders and commands to the related teaching and research Sections. (2) Functional managing personnel, for example, the person in charge of functional sections (offices); they act as the staff and assistants of the school leaders.

This kind of management system centralizes the power and brings out the professional managing efforts of the functional institutes. It is a management form that fits the characteristics of modern technical and vocational schools: Large scale, more majors and strong business sense. Most high vocational, technical and vocational schools, and the adult education colleges adopt this system. Due to the different levels of schools, the functional departments may be classified as sections or offices; if they are sections, there will be offices under each section. Professional functional departments can be teaching and research offices or teaching departments. If they are teaching departments, there will be teaching and research offices under each teaching department. But as a whole, they follow the management system of linear-function. The linear-function system is a comprehensive and balanced management system, but in real running situations, there will be fuzzy areas of responsibilities.

The matrix structure mode. With the development of scale and extension of higher technical and vocational education institutions, the regular management modes cannot meet the schools' development matrix structure, which appears on the basis of reserving the function-oriented structure. This structure set has professional structures as well as managing levels. This represents that the school is a whole body, while set professional departments in an implemental level shows that they are a part of the school. This kind of professional institute does not have full-time workers; its members are part-time workers from the other departments. Matrix structure is beneficial to the unified leadership and the exact management of the linear administrative commanding personnel and functional departments. It is also beneficial to strengthen the horizontal management of research, guidance, and communication. Recently, many schools have established matrix structures, which play an important role in improving the comprehensive and professional management.

In a word, technical and vocational schools in China have various types and levels of the management. The forms of the management systems they have adopted are also diverse, but generally speaking, those forms of management systems reflect the requirements of the Principal Responsibility System. Even in higher technical and vocational schools, which uphold the Principal Responsibility System, are under the leadership of the Party committee. The Party committee won't interfere in the principal's administration; the principal has relatively great autonomy. When involved in major affairs like human resources, institutes environment, cadre's management, and so on, the principal will play an important role because he/she is the member of the Party committee. No matter what kind of institutional selection modes are adopted, in the Chinese technical and vocational schools, the principals take overall charge.

Entrusted by education administrative departments or school boards, the principals lead and take charge of the schools' administrative policies, education quality, administration and management. The aim is to strengthen the schools' vitality and activity of self-development and self-perfection. But the Principal Responsibility System, with its Chinese characteristics has its own requirements and connotations; the Principal Responsibility System must uphold the principle of democratic management and effective supervision.

7.2.2.2 Democratic Management and Supervision of Vocational Schools

Technical and vocational schools and colleges established different organizations to assure teachers and students that they can exercise their democratic rights, carry out supervision and put forward suggestions to the school development. For example, the organization of faculty delegation meeting participates in the decision of school affairs, such as teaching and budget plans. It supports and respects the rector to exercise duties, sustain the authority of administrative system.

It was pointed out in the Decision of the CPC on Education System Reform, issued in 1985, that, "schools carry out the Principal Responsibility System gradually; schools with suitable conditions should establish a school affairs council which is presided over by the principal and have a few members as the deliberative body. Schools should establish and perfect the faculty delegation meeting system, in which teachers are the main body, to strengthen democratic management and supervision." This not only brings teachers' democratic management into full play, but can also turn the faculty's wisdom and enthusiasm into a greater strength in running the school.

The Principal Responsibility System and the democratic management system mutually support each other; democratic management is the basic and important part of the Principal Responsibility System. The principal has to depend on the faculty, especially the teachers' collective wisdom to manage the school. The Principal's decision must reflect the faculty's will. So we must establish and perfect the faculty delegation meeting system, bring the mass's supervision role into full play, and form the restriction system of the administrative process. Currently, technical and vocational schools in China have established the faculty delegation meeting system with different scales; it is the corresponding reflection of the conference system in school management; it has Chinese characteristics and an important supervisory effect on the principal's administration.

The main powers of the faculty delegation meeting system are the deliberation power for the school's major affairs like the plans and summary, financial and final budgets, use of funds, distribution plans, appointment and removal of personnel, and the institutions' environment, and so on; the decision-making power regarding the faculty's vital interests like welfare within the scale permitted by the law and policies; supervisory power over the principal and leaders; power of awarding and criticizing the principal; suggesting to the higher authorities to give awards, promotions or depositions and dismissals. At the same time, the faculty delegation meeting is also an important organization for the faculty's self-education. The faculty delegation

meeting respect and support the principal in the exercise of his duties, in sustaining the authority of the administrative system, and in educating the faculty to obey the regulations and policies. By carrying forward the democratic supervision, the faculty delegation meeting improves the faculty's awareness of the overall situation.

Deliberation power is the key power of the faculty delegation meeting. Deliberation is the examination and discussion on the school's major problems; deliberation power is generally divided into three levels: First, the power of deliberating suggestions. It refers to the power of taking part in decision-making rather than the power of direct decision-making. In this organization, the faculty offers advice and suggestions regarding the school's major decisions, with a view to make them more relevant and feasible, and thus to minimize or avoid mistakes. Second, is the power of deliberating approvals. This power has the nature of accreditation, for example, through the methods of rewarding and punishing, evaluating teachers' performance and so on. Third, is the power of deliberating decisions. This power has the nature of decision making, for example, discussing major problems involving the vital interests of the mass faculty.

In order to bring the effect of a faculty delegation meeting into full play in the school's democratic management, vocational schools at all levels and types devote attention to the following: First, strengthen the leaders and teachers' democratic awareness through various ways. Encourage the faculty to take part daringly and strengthen the representatives' awareness of participating in the management; the school's leaders are required to create a democratic atmosphere; they should get used to being supervised. At the same time, they design regulations to help the formation of a democratic style of management. Second, the faculty delegation meeting must consider deliberation on the school's major affairs as its major work. The affairs deliberated mainly focus on three factors: The first one is whether the decisions are beneficial to the realization of the cultivation target. The second one is whether the decisions conform to the current policies and laws. The third one is whether the decisions are feasible, reliable and practicable. The current deliberation of the school faculty delegation meeting is centered on problems which are related to the school's future, including the administration's direction, developing plans, education reforms, and construction of the teaching personnel, and so on. The representatives discuss carefully and put forward advice, suggestions, and plans. Thirdly, the faculty delegation meeting exercises the power of democratic supervision and management, by offering proposals, and requiring the school leaders to consider and implement those proposals.

There are various ways, forms, and methods of democratic management and supervision in technical and vocational schools. But the faculty delegation meeting is undoubtedly the correct way. In this method, for example, the selection and appointment of the Union Chairman must be approved by the meeting; this is a measure of the democratic management of technical and vocational schools.

In a word, in schools at all levels, the country stipulates the implementation of democratic management and supervision. Schools are required to develop a democratic style of working and to insist on a democratic route, and to believe and depend

on the mass faculty. At the same time, schools are required to establish and perfect organizations of democratic management according to their real situation and democratic requirements.

7.2.2.3 Social Participation of Management Work of Vocational Schools

The development of science and technology and the deepening of the economic reform force the technical and vocational education system to be more diverse, comprehensive, and social. The relationship between vocational schools and society becomes closer and closer. In this situation, only by attracting and organizing the representative authorities and experts, and making full use of the social forces involved in school management, can we deal with the complicated problems of teaching, production, technological service, enrollment, and employment. It is also the basic condition of realizing scientific management in technical and vocational education. Carrying out the policy that education must provide a service for the national economic and social development, and for the development of the society. Societal participation in the school management is for the aim of forming new educational patterns by combining schools, society, and families together, changing the closed and single pattern method used in the past. It is for forming an education system which combines schools and enterprises, education and production, schools and the society. Currently, the social involvement in the management of vocational schools is mainly through the following institutions:

The Board of Directors is the top authority and decision-making agency. It is composed of persons who are in charge of the school administrative maintenance departments, school-running departments and authoritative departments. Its task is to make decisions on the administration's direction, developing plans, major reforms, principal selection, and so on. This form is mainly applied to private schools or schools privately run under the state ownership, and stock system schools.

The Advisory Council is a "think tank" organization composed of entrepreneurs, engineers, experts, and famous persons in educational circles. Its main task is to take part in the consulting activities leading to policy decision-making and technology decision-making.

The School Management Council consists of school hosting departments, related departments and school representatives. Its main task is to negotiate, discuss, deliberate, and decide affairs like guidance for the administration, major construction projects, ideological and political education, faculty personnel construction and major reform plans.

The Joint School-running Office refers to the Party designated full-time personnel who hold posts in offices. Its main task is to coordinate and deal with the work during the school-running process and handle communications with related social departments.

The Community Management Council is composed of leaders who are in charge of education and the personnel in charge of the Department of Labor and Education. Its main task is to have educational output combined with the local economic needs

and encourage the local societal development. They design the overall plans for the harmonious development of education to satisfy the needs of local economy and the society. They are involved in the supervision, consultation and evaluation of the administrations ideas. They organize an educational network which combines schools, families and the society; they create a good social environment for the schools and organize various educational support activities.

The Coordination Council of Extramural Education is a kind of management institute composed by local representatives and the school teachers. Its main task is to take charge of the local students' extramural activities, organize students to take part in practicing social skills, social investigation into other community activities, social service acts of good deeds, and so on. It forms an extramural educational system which combines the society, families and schools.

The Parents Council is composed of the students' parents. Its main task is to strengthen the connection between parents and the schools. On the one hand, parents are required to provide the students' basic situational needs; on the other hand, parents have to coordinate with the schools to educate students and help solve some of the problems in school's development.

7.3 Teacher Management of Technical and Vocational Education

Technical and vocational education in China can't exist and develop without a certain quantity of qualified teachers; teachers are the key factor and the main supporting body for educational development. Technical and vocational education makes special requirements toward on its teachers due to its special educational target, content, and forms. We can draw conclusions from the special tasks that the vocational schools teachers perform. Teachers of technical and vocational education should not only fulfill the task of helping students to acquire a sound cultural and knowledge basis, but should also shoulder the task of giving students the necessary professional knowledge and vocational ability they need. Otherwise, teachers should shoulder the task of promoting practical scientific knowledge and providing vocational guidance. So teachers of vocational schools should have a correct orientation with regard to their roles, have wide cultural knowledge, establish wide professional theories, have wide "dual-competency", ability and have perfect physical and mental qualities. In a word, theoretically speaking, the quality of vocational school teachers is comprehensive and special; the training of these teachers depends on a comprehensive and continuous improvement along with the management process. Since the establishment of the new educational system, we are devoted to the cultivation and management of vocational school teachers; though the program has achieved great achievements, there are still some serious problems among the teachers, like low quantity and quality, unsteady employment and unbalanced personnel distribution. In order to adapt to the needs of the society and the economy, strengthening and improving the teachers

cultivation is the first and main work of teachers management. Now the author will analyze the characteristics and problems of the management of teachers from the background resource of technical and vocational education teachers themselves.

7.3.1 Source of Vocational School Teachers

Vocational school teachers usually come from higher technical and vocational normal colleges, general higher normal colleges, comprehensive universities, and some scientific research units, enterprises, training centers, and so on⁷ (Chen 1999).

7.3.1.1 Higher Technical and Vocational Normal Colleges

These kind of schools are the specialized institutes for cultivating vocational school teachers. They mainly shoulder the task of cultivating teachers who are urgently needed. According to the requirements of the spirit of the Higher Technical and vocational Normal Education Administrative Strategy Seminar in 1991, the task of those schools can be expressed as “one base, three centers.” They are the cultivation and training base for vocational school teachers, management personnel, and technical and vocational education scientific research centers, teaching research centers and information and communication centers. We can simply say that they are the main sources of vocational school teachers. In order to meet the needs of the fast developing technical and vocational educational curriculum, more than 20 provinces have established these kind of schools after 1999; and more than 150 normal higher schools have established secondary colleges by using these resources.

7.3.1.2 General Higher Normal Colleges and Comprehensive Universities

Due to the variety of major settings in vocational schools, it is necessary to make full use of other universities’ educational resources to satisfy the need of technical and vocational educational development. General normal universities mainly cultivate teachers for cultural courses or teachers of professional courses after professional training. Graduates from general universities mainly shoulder the task of teaching professional courses. There is another form, which is to establish technical and vocational normal education departments in general universities to cultivate vocational school teachers. Viewing from the quantity of graduates, it is the main source of providing vocational school teachers.

⁷Chen Xiaobing. (1999). Education Management. Beijing: Beijing Normal University Press: 176–178.

7.3.1.3 Society, Scientific Research Units and Enterprises

Choosing professional technicians and skillful craftsmen to act concurrently as teachers in vocational schools is another important source of vocational school teachers. This is because the major environment in vocational schools changes quickly and it is hard for full-time teachers to adapt to this changing environment. On the other hand, technical and vocational education is closely connected with scientific production. Engaging professional technicians can meet the needs of teaching; through professional technicians, new products, new handicraft, and new technologies can be taught in classroom. There is another reason, it is beneficial to strengthen the connection between the society and enterprises, and that is to establish a bridge between the schools and the society which will be beneficial to the students' employment.

7.3.1.4 Key Construction Bases for the Education of Teachers

In order to carry out On the Action Plan on Innovative Education towards the New Century, the Ministry of Education prudently selected some universities and national key secondary vocational schools to establish 52 key construction bases for the education of teachers, and six demonstrative units for teachers' skill training. Their task is to cultivate and train backbone teachers for vocational schools. Except for the constructing these bases, there are several key universities already carrying out the work of improving the masters of education in these areas. They perfect the teaching cultivation system and improve the level and quality of the teachers. It is an innovation and breakthrough for the cultivation and training of vocational teachers.

7.3.1.5 Training Centers of Technical and Vocational Teachers

In order to meet the needs of technical and vocational educational development, all governmental units have established teachers training centers for all levels and scales. They shoulder the task of educating and training teachers for local vocational schools. It is another channel for providing teachers for vocational schools.

7.3.1.6 Selecting Excellent Graduates from Vocational Schools

As to professional teachers who are urgently needed, vocational schools can select excellent graduates to shoulder the teaching task after training. Those teachers mostly act as student teachers.

7.3.2 Appointment and Evaluation of Vocational School Teachers

7.3.2.1 Appointment of Vocational School Teachers

Teachers' appointment is the key link of teacher management. The followings are the main systems for making teachers' appointments.

First, the appointment of teachers in secondary technical and vocational schools.

The system of dispatching is the traditional system. According to the relevant regulations, higher authorities dispatch teachers to work in secondary technical and vocational schools. Against the background of a planned economy, the distribution of teachers is managed by the higher authorities. Schools have no rights in selecting and engaging teachers, so there was little chance for teachers to transfer freely between schools. This appointment system existed under the situation of a strict centralization management system. At a particular time in history, this appointment system played an important role in stabilizing the number of teachers and developing the technical and vocational educational programs. But in the course of time, the disadvantages of this system became more and more obvious: Under this system schools had no right to select and engage teachers, which was not good for maintaining a viable pool of teachers; teachers could not freely choose schools that went against their personal initiatives and work ethics. Because only the higher authorities had the right of selecting and engaging teachers that easily led to bureaucracy and other unhealthy unintended consequences. This was the main system of appointments before the reformation and opening up to the outside world. It was gradually replaced by new systems of appointment.

The system of examination and engagement is a system of recruiting teachers by unified tests. Transplanting the system of recruiting by public officials into the system of appointment of teachers by testing is a kind of reflection on, and a requirement of, the development of the social economy at that time and upon education as a career.

The system of engagement is a system of engaging teachers to work in schools within a certain period of time according to the needs and requirements; it adopts the form of assigning contracts and issuing appointment letters. When engaging, it is necessary to stipulate the teachers' responsibilities, rights and treatment. After the expiration of the contract, according to teachers' performance, the schools can continue or stop the work engagement contract. Currently, it is the teacher appointment system adopted by technical and vocational schools after the reform of the personnel management system.

Secondly, the appointment and management of teachers in higher vocational schools.

The teachers' appointment system at higher vocational schools has gone through various stages as described above. Currently, higher technical and vocational education adopts a form that combines full-time and part-time teachers. There are three situations: In the first case, higher technical and vocational education teachers are recruited by the general higher schools; in the second case, they are taken by local

governments; in the third instance, they are recruited by social forces (including enterprises). In the first situation, the higher technical and vocational education schools mainly depend on the schools' own teaching staff. Higher technical and vocational education shares resources with the general education school. When there is a shortage of teachers, the schools will engage a small quantity of full-time teachers and a large quantity of part-time teachers. Though the teaching force is relatively guaranteed, there will still be a lack of "dual-competency" teachers. In the second situation, the teaching staff of higher technical and vocational education is mainly the schools' teachers; though they are mostly "dual-competency", they are secondary vocational schools' teachers originally; objectively speaking, their quality should be improved. In the third situation, the teaching staff is mainly part-time teachers whose quality is low; and the educational quality cannot be guaranteed. The current situation of higher technical and vocational education teachers is not optimistic; the management of the teachers is also weak.

7.3.2.2 Title and Its Evaluation and Engagement of Vocational School Teachers

The evaluation and engagement of teachers' titles is an important link in the construction and management of the quantity and quality of teachers in the system. Fulfilling the evaluation and the hiring of teachers in the various titles can arouse teachers' enthusiasm and creativity, and excite their passion for learning and improving quality. It can impel them to work patiently, to shoulder teaching task actively, and spur them to implement programs with a sense of responsibility endowed by the society.

The following will introduce the related stipulations on the evaluating and hiring of teachers in the various professional technical posts in secondary, higher vocational, and technical schools.

First, is the responsibility of professional technical posts for secondary technical and vocational school teachers.

Due to historical reasons, secondary vocational schools in China are complicated in type, multiple in names, and different in titles and standards. Technical schools and secondary schools have special standards, while occupational schools and vocational secondary schools carry out the standards of the general high schools, according to the needs of the current vocational schools teaching. The professional technical posts regulations for technical school teachers that are close to that of the teaching of vocational schools and can represent the features of these schools.

It was stipulated in the Proposed Regulations on Teachers Posts in Technical Schools that the posts of teachers of cultural courses and technical theory courses are: Senior lecturer, lecturer, assistant lecturer and instructor, while senior lecturer is senior title, lecturer is an intermediate title, assistant lecturer and instructor are elementary titles. The post names of teachers for production and practice courses are: Senior student teacher, student teacher with professional title one, student teacher with professional title two, and student teacher with professional title three; while senior student teacher is a senior title, student teacher with professional title one is

an intermediate title, and student teacher with professional titles two and three are elementary titles. In this regulation, it clearly stipulates the working responsibilities and conditions for hosting the posts; those responsibilities and conditions for hosting the posts become the basis and guidance for constructing and managing secondary technical schools teachers.

It was stipulated in the Proposed Regulations on Teachers Posts in Technical Schools that: Provinces, autonomous regions, municipality cities, or ministries, and commissions shall establish councils for evaluating the teachers' professional technical titles and to take charge of evaluating the qualifications of senior titles. Local technical schools shall establish corresponding organizations for evaluating teachers' professional technical titles and to take charge of evaluating the qualifications of elementary and intermediate titles.

The evaluation of the senior lecturer and senior student teacher should be approved by the local evaluation organization and then be examined by the evaluation councils of provinces, autonomous regions, municipality cities, or ministries, and commissions. The evaluation of lecturer and student teacher with professional title one should be approved by the school evaluation organizations and be examined by the local evaluation organizations. The evaluation of assistant instructor, student teacher with professional titles two and three should be approved by the school evaluation organizations. Teachers who have passed the title evaluation can be engaged by the principals.

Secondly, is the responsibility of professional technical posts for higher technical and vocational school teachers.

Higher technical and vocational education belongs to the higher education system, so its teacher evaluation and engagement will follow the Proposed Regulations in the Higher School Teacher Title. The names of teacher titles are: Assistant lecturer, lecturer, associate professor and professor. Assistant lecturer is an elementary title, lecturer is intermediate title, and associate professor and professor are senior titles. The Proposed Regulations in the Higher School Teacher Title stipulates the exact responsibilities and qualifications of each title. Those stipulations became the basis and policy for managing higher school teachers. In order to adapt to the teaching characteristics of higher vocational schools, each of the higher schools issued special managing stipulations under the leadership of the departments in charge. These stipulations give prominence to the practice of guiding responsibilities and abilities of higher vocational schools' teachers; it is also a characteristic of managing the teachers. The engagement or appointment of higher vocational school teachers' titles upholds the principle of working the posts required; the dean or the director of the teaching and research office present the persons selected; having passed by corresponding evaluation organizations, they will be engaged or appointed. The following are the stipulations on evaluating and appointing teachers' qualification.

7.4 Other Management of Technical and Vocational Education in China

7.4.1 Major Management and Curriculum Provision

Since technical and vocational education influences employment directly, the major framework is of vital importance for the success of the entire technical and vocational educational system. In the case of secondary technical and vocational educational schools (including occupational schools, secondary schools, and technical schools), their major environments have two situations: (1) In schools managed by counties and cities, according to the related national stipulations, the administration department at the city level determines which academic majors will be offered according to the conditions of the local economy and societal needs, and according to the qualification of the teachers, training bases, and the school's computers hardware and software. (2) In secondary technical and vocational schools directly managed by provinces (municipality cities, autonomous regions), their majors being offered should be determined by experts both in and out of the school, and approved by the Department of Education. In determining what curriculum should be offered, secondary schools should, on the one hand, carry out the related stipulations of the government agencies, highlight the characteristics of the academic majors, and assure students that they will have the required basic professional qualities needed at graduation. On the other hand, schools should combine open, flexible, practical and special courses to satisfy societal needs and the students' need for individual development. Specialized courses are different from selective courses; they satisfy different teaching realities under different situations and in different areas. The length of time to complete a course of study at secondary vocational schools ranges generally from two to three years, mostly three years. The first year mainly includes cultural and public basic courses; the second year includes the professional basic and advanced courses; the third year includes practice and training.

As to the determination of which academic majors will be offered by the higher technical and vocational educational schools, after fulfilling the basic requirements and trying to predict societal and the schools' various needs, the higher vocational colleges decide their own arrangement of academic majors, which will be approved by the higher administrative departments. The higher vocational colleges will also take charge of determining their own curriculum. Generally, a college major guiding council, and experts from various industries, study and decide the curriculum criteria of each major being offered according to the requirements of the posts. The corresponding teaching plans will be implemented by that section, according to their procedures and the exact situation needed. The classrooms will be designed by experts and the professors. The autonomy of curriculum development lies within the colleges. The teaching outline of each course is compiled by experts of this course and implemented by the instructors. The curriculum environments and the teaching plans of higher technical and vocational education schools are not unified. Each school has its own characteristics, basically they include three parts: Public basic

courses, specialized basic courses, and specialized advanced courses. The teaching plans follows the class hour ratio of 4:3:3 for each course respectively. Since there are many class hours, the length of schooling is generally three years, and there are at least two terms arranged as specialized practice. In a word, higher technical and vocational education has more management requirements.

7.4.2 Teaching and Training Management

Combining theory and practice is the basic characteristic of technical and vocational educational teaching which meets the vocational targets. With the development of new technologies and industries, along with their requirements together with the tendency of emphasizing theoretical knowledge over practical ability, the public has a high demand for applied teaching.

As for teaching, the situation of secondary technical and vocational schools is similar to that of the higher technical and vocational schools: Within vocational schools, teachers carry out assignments according to the plans issued by the teaching department; the teaching department will take charge of examinations, supervision and management activities to assure the teaching quality. The measures adopted include mid-term evaluations, classroom observations by supervisors, collective teaching and research activities, and follow-up investigation of the graduates. Through the above measures we can evaluate the supervision for both the education in process and in its final results. As for the form of the teaching method, both secondary and higher technical and vocational schools adopted the traditional teacher-based form; the students' choice is limited to selective courses. In schools, teachers are the providers of knowledge; students usually follow the teaching arrangement. In the assignment of teachers and the choice of what they are going to learn, the forms, locations and evaluation methods, students have no choice. The teaching organizing forms are fixed and not varied, and are uninteresting which do not satisfy the learning needs of part-time students. In addition, since the development and the promotion of management software is not as expected, the students registration, status management, and curriculum information still follow the traditional management mode. The efficiency of teaching management work is low, which is especially true in higher vocational schools. On the one hand, many higher vocational schools have been upgraded from secondary vocational schools; they lack freedom and self-restriction in teaching management. On the other hand, there are not enough computer software and hardware for the students' registration and status management; the whole teaching management program does not seem to adapt to the developmental needs of higher technical and vocational education.

As for practical teaching, we fully realize its importance in cultivating applied talents. Both secondary and higher technical and vocational education emphasize practical teaching. The Ministry of Education and the departments of education in the provinces and local areas all have regulations for strengthening the practical link of technical and vocational education. They stipulate that the class hours of practical

teaching should be more than 50% of the theoretical teaching. When compiling teaching plans, except for specialized practice, there should be at least one term of comprehensive practice to strengthen vocational skills training and the students' applicable abilities. The exact implementations are different because of different historical backgrounds, current basis and situations. Generally speaking, schools which are started in areas where the economy is developed with a sound basis and have the power to run schools, their equipment, bases, and the quality of practice guiding personnel can satisfy the related stipulations and can assure the foundation of the students' practical ability and quality of workmanship. But in other areas, especially the western areas where the economy is underdeveloped, and restricted by funds, schools' experimental conditions and training bases are limited; they cannot satisfy the needs of higher vocational hands-on teaching. In addition, although there are clear laws, regulations, and requirements regarding practical teaching to guarantee the quality of the workmanship, there is a lack of corresponding detailed rules, especially the necessary supervision, examination, and quality control of the management for the training.

7.4.3 Textbook Management

Textbooks are the main medium of teaching. We can implement and fulfill the teaching task, input knowledge and cultivate the students' abilities through textbooks. Managing the textbooks of a technical and vocational education well is the material premise of assuring educational quality. In secondary technical and vocational education, basic courses like Math, English, Ideology, and Politics adopt special textbooks, because those textbooks are just suited for the students of this type of secondary education. The specialized courses generally adopt textbooks recommended by the local education administrative departments. Those textbooks usually have many editions. Local departments of education select some of them and recommend those to the schools according to the local situation and/or the unique features of the textbooks. The schools are mostly willing to use these textbooks, because part of the courses the students have are combined with the examination for the vocational qualification certificate held by the Department of Labor. Adopting textbooks recommended by the educational administrative departments is beneficial in carrying out the teaching assignments. It will be helpful for the students to acquire the corresponding qualification certificate and in getting employed. In some schools, the teachers can select some of the textbooks.

Textbooks selected by the higher technical and vocational education schools are of two kinds: The first one is for the public basic courses; most schools choose editions for a general higher education, for example, college English, higher mathematics, and computer application basis. Surely there are many editions, some are published by the schools' publishing houses, and others by special publishing houses. The second kind of textbooks are for specialized basic courses and specialized advanced courses. Most schools will preferentially choose specialized textbooks for a higher

technical and vocational education, especially those traditional majors with long histories; their construction of textbooks and resources are relatively mature and standardized; and there are a series of textbooks with common characteristics and high quality. Those textbooks are compiled according to the cultivation target and for students' which have the characteristics for a higher technical and vocational education; they are suited to the students' advanced knowledge and skills. If there are no special textbooks, schools will generally use indiscriminately the editions of general higher education; they are usually adopted by the newer academic majors and courses. The final selection of textbooks will be decided by the teaching management departments and the teachers who teach this course. After choosing textbooks for a general higher education, according to the cultivation target, teachers will deal with those textbooks to have them satisfy the students' real needs. Generally speaking, the selection of textbooks is done without the necessary measures of evaluation and quality supervision.

7.5 Thinking for Improving Technical and Vocational Education Management

7.5.1 Improving the Macro-Management of Technical and Vocational Education

First, Improving the macro-management of secondary technical and vocational education.

Although the key status of the municipal (local) government in the management system was established in 1991, in the Decision of the State Council on Developing Technical and Vocational Education, which put forward an outline of planning the management system under the guidance of national policies, the establishment of the system is only a part of the whole work. The implementation of the municipal (local) government's overall planning is the best choice for improving the macro-management for secondary technical and vocational education. This system should be perfected, which means that the corresponding conditions should be created to assure the system. The following work should be done.

Endow municipal governments with the power of overall planning. Perfecting the management system of these governments' overall planning is undoubtedly a fundamental reform of the management system for secondary technical and vocational education. The current technical and vocational education management departments must consider the situation and endow the local technical and vocational education system with the autonomy of management. Central comprehensive management departments should respect the management decisions of the local governments and actively improve and develop these governments' overall planning skills. When establishing technical and vocational schools, the central government, and its subsidiary enterprises and institutes, should all be managed by the local governments.

Counties and districts should obey the overall planning, and obey the leadership of these local governments. They should follow the spirit of coordination in the enrollment plan, major adjustments, contracted training, and the supply and use of the human/financial/material resources. They should shoulder more of the tasks in developing the local schools.

There should be an insistence on managing education by law, and strengthen their enforcement. The 19th Meeting of the Standing Committee of the Eighth National People's Congress approved the Vocational Education Law of the People's Republic of China, which is the first complete technical and vocational education law. It provides guarantees for the development of technical and vocational education in law and policy. The issue of this law fundamentally changed the situation of developing education through administrative methods; governments at all levels have no enthusiasm for embracing technical and vocational educational systems. It is a good beginning to managing education by law. But since the law for technical and vocational education is a macroscopic law, it lacks details in distributing human/financial/material resources; and there are cases of failure to observe the law. So when implementing the law, local governments should design exact implementation regulations according to the local situation, so that the compliance of this law can be guaranteed.

There needs to be a perfection of the coordinated reform for the labor and personnel systems. Currently, many industries follow the system of holding posts by certificates; it has become popular in different trades. The employment permission system guarantees the development of technical and vocational education. More industries and enterprises require their employees to have certain proof of a credential and/or a professional skills grade. Those certificates are vocational grade certificates and show a practicing qualification that the graduates of the technical and vocational schools and training institutes acquired during the process of their education. Acquiring a vocational qualification certificate will be the important basis of gaining labor employment, upgrading of enterprises, and professional evaluation. The objective's requirement of "training before employment", and "mount guard with certificate" make taking part in vocational training and technical education a must. Only assisted with the corresponding reform of the labor and personnel system, can we provide the motivation for developing the technical and vocational education.

There needs to be an enlargement of the investing channel towards technical and vocational education, and perfecting the investing environment. Secondary technical and vocational education, as the most mature part in the educational system, still has many problems; the main one is the lack of funds. Many professional training fields cannot be constructed, the professional equipment cannot satisfy the teaching needs, and the schools' cultivation target cannot be achieved. In order to solve these problems, we must change our attitudes and enlarge the investing channels, changing the current school funding mode of depending on the government's investment; we must form a new mode of financing schools, with investments from the nation, local areas, the society, and individuals. The nation should adopt favorable policies, acquire attitudes that the technical and vocational education is the basic education that every employee has to receive. According to the situation where the technical and vocational education needs a large amount of funds, the governments should

increase the funding year by year. The input of local finances into the technical and vocational educational system should take a certain percentage of the total local educational funding. Under the principle of “the one who runs schools will enjoy the benefits, the one who enjoys the benefits will provide the financial support”, enterprises and institutes involved in the running of school should first guarantee the teaching funds for the joint-maintenance of the various academic majors; its standard should be decided according the professional teaching needs.

Secondly, Improving the macro-management of higher technical and vocational education.

Carrying out a cooperative system between the central and local governments is needed. Unilateral centralism and unilateral decentralism go against the macro-management of higher technical and vocational education. The centralism in educational administration is beneficial to the unification of educational policies, overall planning, and the development of the education career. It is also beneficial in regulating the unbalanced educational development in different localities; it is beneficial to unifying educational standards and maintaining the overall level of educational development. But the centralism in educational administration, is liable to lack flexibility in administrative management, and it is hard to bring out the enthusiasm, creativity, and activity of the lower departments. The biggest advantage of decentralism in educational administration is that it brings flexibility to educational administrative management and develops educational needs according to the local conditions. The reservation of power in local governments can bring out the enthusiasm, creativity, and activity of the local and lower governments into full play. But the over-scattering of power will bring many problems, which will lead to blindness and confusion in the educational development; the whole function of the educational administration cannot be realized.

The analysis of the advantages and disadvantages of centralism and decentralism in an educational administration shows that handling the relationship of centralism and decentralism is an important issue in the educational administrative system. Countries all over the world have tried their best to deal with the relationship; they have made many experiments to avoid absolute centralism or decentralism. Some countries have formed a cooperative system between the local and central governments, or a system between centralism and decentralism. Take Japan for example, its development of higher technical and vocational education is obvious; it has a close relation to its balanced and straight relationships between local and central governments in managing education. Higher technical and vocational education in China can absorb the management system mode of Japan, which has a similar cultural background, so that vocational education in our country can develop reasonably and scientifically.

Implementing the system of the division of work among different departments under the overall planning of government has helped. Higher technical and vocational education’s characteristic emphasis on practical experience decides its close relationship with enterprises and their production. So it is hard for the educational administrative departments to manage solely by themselves; it is necessary to implement the system of division of work among related departments (like the Departments

of Labor and Industry and Commerce, Trade and enterprises). It is beneficial to not only the students' practical experience and training, but also to the administrative bodies of higher technical and vocational education; it also opens up more sources of funds. Governments of all levels should strengthen the management's plan for development, resources distribution, conditional guarantees, and policies and measures; governments should also provide higher education with a powerful public service and a good developing environment. We should manage education strictly, and lead high education to a healthy, coordinated and sustainable development. We should establish a system of supervising and examining the work of higher technical and vocational education regularly and consider the supervision of it as the important content of educational supervision, and strengthen its evaluation and examination. Higher technical and vocational institutes should run schools according to the societal needs, adjusting the choice of academic majors, and curriculum content so as to have a close connection with the enterprises' real-life situations; they should strengthen the relationship with enterprises, strengthen academic investigations and research as well as developing the planning and prediction capabilities of human resources.

Establish and perfect the rules and regulations of higher technical and vocational education. Establish and perfect the rules and regulations are the guarantee for the sustainable development of higher education. Educational rules and regulations are the criteria, basis, and standard that must be followed when hosting an educational career. Through the adjustment of the social relationships within the field of education, the spirit of a smooth application of these educational rules and regulations will assure the country's leadership and management about the efficiency of the educational system; we should strengthen the steady growth of the educational administrative management system; it will help to eliminate the interference of emergent factors, and improve the efficiency of the educational administrative management system, as well as the development of this system. The management of higher technical and vocational education must be regulated by perfecting the spirit under which these rules and regulations are applied.

In this part, developed countries have provided good examples for the development of Chinese technical and vocational education. We find that in countries with excellent technical and vocational education, like America, Japan and Germany, their legislation on technical and vocational education has high standards and their implementation of their laws are also fair and just. So we can see the importance of managing education with law. Till 1996, China had its own law of technical and vocational education—the Vocational Education Law of the People's Republic of China. Experiencing more than ten years' of development, the concept of managing education with laws has been deeply rooted in the educators. But since Chinese technical and vocational education has a large scale and unbalanced development, the historical and current reasons make it rather difficult to implement the rules and regulations. And there is still a process of perfecting the corresponding detailed rules and regulations; the stable and ordered development of technical and vocational education needs a progressive process.

7.5.2 Improving the Micro-Management of Technical and Vocational Education

7.5.2.1 Improving Inner Management System Within Vocational Schools

Both higher vocational schools and secondary schools are faced with the problem of how to reform the schools' inner management system. As for secondary vocational schools, the key to reform lies in the inner management system, in which deepening the personnel distribution system is the key. First, we should perfect the principal appointment system; implement the principals' status as the legal representatives and their rights and duties of managing the schools according to the laws. Secondly, we should set posts scientifically according to real needs and regulate the responsibilities of each post. We should strengthen the target of the responsibility for the system and decide on the different working quantity, qualifications, and treatments of the managing personnel, teachers, and assistant personnel. Schools should set certain posts without them being fixed, and establish an employment mechanism that combines fixed posts and unfixed posts. Thirdly, we should carry out a teacher appointment system. On the basis of scientific criteria, we should strengthen the evaluation and competitive employment procedures. Fourthly, we should deepen the reform of the income distribution system. Staff's income should be connected with their schools' development and their posts; the incentive mechanism should be strengthened in the income distribution system to arouse the teachers' enthusiasm.

The situation of reform in higher and secondary technical and vocational schools is the same. We should deepen the inner management system's reform, in which the reform of the personnel distribution system is the key. It is necessary to implement the Principal Responsibility System and the term system under the leadership of the Party committee. We should carry out the staff appointment system and the post management system, and establish a system that can attract and stabilize talents as well as make it flow reasonably. We should establish a system of democratic and scientific management with democratic supervision, through the multiple ways and forms like the teachers' and students' delegation meetings. Through a regular information report, and a forum that solicits opinions, invite teachers and students to offer advice on managing schools, find out and solve the problems in education, teaching, and management, and provide ideas for the schools' reform. Besides, we should retrench the management institutes; carry out the policy of "big school, small institutes." We should improve management efficiency. We should implement a "contract system" and a "working itinerancy system" toward administrative management personnel to decrease their inertness. The managing concept of "administration is service, management is business" should be deeply rooted in administrative personnel within the higher technical and vocational educational systems. Management personnel of higher schools should implement the following requirements: Implement the decisions faithfully, fulfill the task within the least amount of time and with the highest

efficiency, be kind to the staff, be good at coordination with others, and show a passion for your work and for the teachers and students.

7.5.2.2 Reforming Management of Majors and Curriculum of Vocational Schools

The management of determining the choice of the academic majors offered directly relates to the employment situation of the graduates; it also indicates whether vocational schools can attract students. Currently, there exist some problems in the major determination process of secondary vocational schools; for example, the majors' names are not standard, their connotations are not clear, and the professional teaching is not rigorous. These problems seriously influence the technical and vocational education's functions of providing service to the economic community and for social development. So it is necessary to have a scientific process for determining the majors being offered, standardizing the names, and having clear connotations of their purposes and contents. The major division should conform to the related standard of the national division of vocations; we can divide majors according to the required qualities and vocational abilities, rather than previous dividing mode of trade and types of skills/services. From the planning, implementation, and management of majors to teaching them, each link should have its basis and conform to the rules of education and teaching. We can make reasonable adjustments on the basis of objective rules. The majors being offered should adapt to the needs of economic construction and social development; determinations being made according to the needs that reflects the requirements of social vocations for their talents. This requires that the major's structure must adapt to the local industry and employment structure; the specialty caliber should adapt to the situation of the vocation's division. What's more, the major selections must conform to the developing situation of the secondary technical and vocational schools. The major selections should not only meet the social needs, but also consider the reality of the possibility of being economically viable, conform to the schools' situation, including material conditions and teachers. What is more, it should conform to schools' characteristics, developing targets and environments where they will more likely be used in the current location, economy, and within the society. Besides that, when realizing social needs and functions, we should consider whether the major selections are reasonable and economical, and whether it can achieve efficiency. In short, it refers to whether major selections should conform to the social and economic development; teaching content should conform to social vocational reality, thus the talents cultivated can get employed as expected and create societal wealth.

Higher vocational schools should try hard to change the traditional mode where the major selection process faces new subjects, and constructs new majors and reconstruct traditional majors, and improve the social adaptability of majors. The major selection process of higher vocational schools should adapt to the social needs. When considering the majors being selected, we should carry out wide social investigations, learn about the changes in the local industrial and social structures, as well as what

talents are in demand, and establish corresponding majors according to the needs of labor and talents. Surely we should insist on the principle of combining scientific processes and adaptability in establishing new majors; first, we should keep the students' sustainable development. Vocational development is the basic way to human development. With the development of the social economy and vocations, people are no longer doing the same kind of job throughout their entire lifetime. So employees should have a broader vocational vision; healthy vocational values, long-term vocational plans, and the awareness and ability of adaptation, and the creativity to coordinate vocational change and their self-development. Secondly, we should keep the sustainable development of majors which means the majors themselves should have a self-adjusting, self-developing, and self-renewing capacity to adapt to the constant changes in enrollment, the employment market, and the vocational environment under the market economy. We should develop the connotation of majors, improve the quality of the majors, cultivate talents with high quality, and assure that the academic majors can develop continuously. Thirdly, we should keep in mind the sustainable development of schools. Any majors selected should provide service to the schools' whole interest and follow the schools' comprehensive developing plan. They should be in compliance with the planning and distribution of the education resources and other benefits.

As to the curriculum compilation, both secondary and higher schools should stress the characteristics of technical and vocational education. The improvement target of technical and vocational education is the direction and starting point of compiling curriculum. Its connotation of cultivating applied talents stipulates the exact knowledge and ability structures that students should acquire through this education. It also decides that the class-hours of theory courses should be much less than what they are in general schools. So the curriculum compilation of this type of education should start from the real needs of each major as well as their different improvement targets, and have scientifically and reasonably designed the curriculum under the principle of "educate according to the needs, combine learning and applying, enough and appropriate." As to the curriculum content, we should emphasize the direction and practicability of specialized advanced and basic courses, and fully reflect the basic courses' function as providing service for specialized advanced and basic courses.

7.5.2.3 Reforming Teaching Management of Vocational Schools

Teaching management is an important part of vocational school management. It is the guarantee of the realization of the improvement target, establishing normal education and teaching order, and improving teaching quality. The construction of the important contents of teaching management organization system consists of the management of teaching implementation, of teaching plans, and the evaluation of teaching quality. Strengthening the teaching management is the key to improving school management for technical and vocational education, while strengthening the management of practical teaching is the most important part. The teaching process

emphasizes practical teaching links. Emphasizing the cultivation of the post's ability is not only the characteristic of technical and vocational education, but is also the main link in realizing its target. The basic task of technical and vocational education is to cultivate secondary and higher applied talents for production, service, construction, and management; those talents must have strong practical ability. So we should strengthen the construction of experimental labs and training bases, by creating a technological operations atmosphere for students to operate independently in imitative environments. At the same time we can construct a series of "teaching training bases" to have students practice their working ability and professional skills. Besides that, we can cooperate with enterprises and institutes to strengthen the social connection and improve the quality of vocational education.

7.5.2.4 Reforming Teacher Management of Higher Vocational Schools

Compared with teachers of general education, there are special requirements for certificates, qualifications and ability structures for teachers of technical and vocational education. Those requirements are the basic guarantee of technical and vocational education teaching quality. The task of teacher management is to make an analysis of the teachers at all levels and types, according to the improvement target and specialty structure, make reasonable arrangements, including teachers' specialty structure, knowledge structure, and ability structure. As to the managing personnel, the nature of teacher management is to provide services to teachers and provide conditions to teachers for playing their part. We should design a series of rules and regulations to regulate the teachers' teaching and scientific research, examine teaching plans, procedures, situations, and daily records of work. During the examining process, the managing personnel should heed the teachers' advice and opinions regarding the management and reform. The development of Chinese technical and vocational education depends on a technical and vocational education teaching group with high quality. Managing personnel should consider the construction and management of teaching groups from a macro and long-term point of view. Technical and vocational education should move in the direction of "dual-competency", which means that teachers should have both high theoretical level and strong operational abilities. So teacher management should be reformed around the cultivation and professional development of "dual-competency" teachers.

7.5.2.5 Reforming Textbook Management of Vocational Schools

Textbook construction is the material premise and basis of implementing curriculum reform and improving teaching quality. The textbook management mode of secondary technical and vocational education is relatively mature, but also a bit rigid. On the one hand, it is the limitation of the whole secondary technical and vocational education management system; one the other hand, it is the limitation of reality. The frontline teachers have little possibility to be involved in the construction of text-

books. Both the teachers and students would feel frustrated with textbooks that lack practical value. How to arouse teachers' enthusiasm and meet the needs of students while guaranteeing the unified quality of textbooks is the problem that textbook management of the educational system should consider. There is a relatively wider range of textbooks to choose from for the higher education schools; there are several points that we have to follow when choosing textbooks: First, textbook management should guarantee the quality of the textbooks. The quality of textbooks is the key to realizing the improvement target. The basic requirements of textbooks are: Textbooks should be scientific, advanced, standardized, systematic, rich in content, and practical. Secondly, textbook management for high technical and vocational educational schools should make plans, establish a textbook evaluation system, design regulations on the compilation, organization, examination, and evaluation of textbooks, and implement them strictly. Thus it is important to standardize the compilation of textbooks and to improve their quality; it is also important to introduce the competitive system into textbooks construction, and arouse the enthusiasm of each department in this work. Finally, we should strengthen the research on textbooks and enhance their construction with advanced theories.

Chapter 8

Transformation of Technical and Vocational Education: From Quantity Expansion to Quality Improvement



To meet the needs of international competition, socialist modernization and economic transition, technical and vocational education in China has made a significant transformation in recent years. The transformation manifested as a leap from quantity expansion to quality improvement. Focusing on the quantity-to-quality leap, this chapter will discuss three issues: (1) the reason why technical and vocational education and training in China need to be transformed; (2) measures taken to realize the transformation; (3) changes taking place during the transformation. These issues will be probed into from the four aspects: factors pushing the transformation progress; specific measures to realize the quantity-to-quality transformation, from the aspect of increasing the educational vitality, enhancing teaching and training efficiency, improving management and evaluation methods and completing external guarantee mechanism; some detailed examples given to prove that schools and relevant stakeholders have already taken actions to improve the quality of vocational education and training; the inspiring outcomes are given: the enriched educational resources, the strengthened teaching ability of teachers, the enhanced employment rate of students and the established quality assurance system.

8.1 Factors Pushing the Transformation Progress

There are three factors pushing the transformation progress, the need of self-development of education, the need of sustainable development and the need of economic development.

8.1.1 The Needs of Self-development and Sustainable Development

It's known that the internal law of education development is that the focus changes from quantity to equity to quality. With the financial abundance and technological advancements, the aim of providing everyone with proper educational opportunities has been realized to some extent. Finishing the task of expanding education scale and giving equal opportunities, improving the quality of education and training becomes the focusable aim. In recent years, more and more countries have gradually realized the importance of improving the quality of technical and vocational education and training and accordingly introduced relevant policies. Russia and America follow this global trend to promote the development of vocational education and training. "The Modernization of Russian Education Before 2010" is issued by the Government of the Russian Federation to build the quality assurance system of education; "Investing in America's Future: A Blueprint for Transforming Career and Technical Education" issued by U.S. Department of Education also highlights the importance of strengthening education system to equip students with vocational skills. This global trend also reflects the internal law of education development: the focus changes from quantity to equity to quality. With the financial abundance and technological advancements, the aim of providing everyone with proper educational opportunities has been realized to some extent. Finishing the task of expanding education scale and giving equal opportunities, improving the quality of education and training becomes the focusable aim. In case of being the disconnection between education and the real world of work, it's necessary for education to continuously refresh and make reforms, fostering newly talents for social and economic development.

Nowadays, global wealth is growing at breakneck speed while unsustainable patterns of economic production and consumption contribute to global warming, environmental degradation and an upsurge in natural disasters. Education plays the role of finding sustainable ways to respond to these challenges. It is possible to transform people's thinking style and lifestyle into sustainable pattern by means of education. Education including technical and vocational education and training is a necessary foundation for learning and living in a more complicated and rapidly changing world. Nowadays, global wealth is growing at breakneck speed while "unsustainable patterns of economic production and consumption contribute to global warming, environmental degradation and an upsurge in natural disasters".¹ Education is asked as well as able to find sustainable ways of responding to these challenges. Its' possible to transform people's mind-set into sustainable thinking and then shape sustainable living and production behaviors of people by means of education. To realize these amazing shifts, one important premise is improvement in the quality of education.

¹UNESCO. Rethinking Education: Towards A Global Common Good[EB/OL]. <http://unesdoc.unesco.org/images/0023/002325/232555e.pdf>, 2016-03:10.

8.1.2 The Needs of Economic Development

Economic transition calls for high-quality talents, pushing the quality improvement process of vocational education and training. In China, economy is undergoing deep transition and upgrading, calling for new forms of technical and vocational education and training to cultivate the talents needed in the labor market. Formulating “Made in China 2025” strategy, implementing “Internet Plus Action Plan” and promoting popular entrepreneurship and innovation, China’s economic development has entered a new model. To create more dividend of qualified personal as well as to transform China from a manufacturer of quantity to one of quality, improving the quality of technical and vocational education and training is imperative. Technical and vocational education and training plays a key role in facilitating students and workers with knowledge, skills and competencies contributing to economic transition and industry upgrading. In the 2016 Report on the Work of the Government, the aim is made clear that by 2020 the labor productivity should rise from 87,000 to over 120,000 and the contribution of technology advancement to economic growth should account for 60%.² This milestone can be realized through nurturing high quality people with information technology, innovation, creativity ability and other requiring knowledge and skills. The need of fostering new type talents pushes the quality improvement process of vocational education and training.

8.2 Policies to Improve the Quality of Technical and Vocational Education

Having realized the importance of quality improving, vocational schools, enterprises, local governments and other stakeholders are making efforts to implement relevant policies. In the past few years, policies have been formulated to improve the quality of technical and vocational education and training, which has become a common sense in China and a series of policies have been introduced. These polices intend to promote the quality improvement process from four aspects: increasing the educational vitality, enhancing teaching and training efficiency, improving management and evaluation measures as well as completing external guarantee mechanism.

8.2.1 Increasing the Educational Vitality

The first sort is policies to increase the educational vitality. To increase the educational vitality is to improve the education and training quality from the beginning. Two specific measures play the “gatekeeper” role. One is involving enterprises into school

²Government of the People’s Republic of China. Simple Reading of 2016 Report on the Work of the Government[EB/OL]. http://www.gov.cn/xinwen/2016-03/05/content_5049333.htm, 2016-03.

running, aimed at matching school teaching with enterprise production. Hence, the school-enterprise cooperation in the form of apprenticeship is encouraged. The other one is reforming the recruitment system, hoping to enroll diversified talents with different specialties. And some policies have pointed out that vocational schools should evaluate students according to knowledge and skills in separate entrance examination, which is different from higher college entrance examination.

The school-enterprise cooperation is a general model to involve enterprises into school running. The “Innovation and Action Plan of Higher Vocational Education” points out that higher technical and vocational education colleges and local enterprises are encouraged to make cooperation. Development on school running and personnel training so as to create a win-win situation.³ In this model, enterprises and schools cooperate to recruit students, design courses, carry out teaching and training programs, evaluate students’ performance and so on. Besides, the productive training base, technique service and product development center as well as entrepreneurship practice platform are required to be built by schools and enterprises. After building the above-mentioned organizations, it is predictable that the technical skills accumulation capacity of technical and vocational education and training colleges as well as the seeking and creating employment capability of students will be improved.⁴ What’s more, the apprenticeship of the school-enterprise cooperation model should be highlighted. In the “Opinions on Carrying Out Apprenticeship Pilot of Ministry of Education”, the importance of apprenticeship is described as realizing five connections between school majors and industrial needs, curriculum content and professional standard, teaching process and manufacturing process, graduation certificate and professional certificate, lifelong learning and vocational education and training.⁵ To successfully implement apprenticeship, students recruitment and workers employment should be combined, working and learning should be integrated, school teachers and enterprise masters should make cooperation on students training, teaching management and quality supervision system should be established.

To promote students development and select useful talents, the recruitment system of technical and vocational education and training is being reformed based on the principle of social equity. In 2013, the Ministry of Education carried out “Opinions on Promoting the Recruitment System Reform of Higher Vocational Education”. Examining and evaluating students in accordance with their knowledge and skills is

³Ministry of Education of the People’s Republic of China. Innovation and Development Action Plan of Higher Vocational Education[EB/OL]. http://www.moe.gov.cn/srcsite/A07/moe_737/s3877/201511/t20151102_216985.html, 2015-10-12.

⁴Ministry of Education of the People’s Republic of China. Opinions on Deepening Vocational Education and Teaching Reform and Improving the Quality of Talent Cultivation of Ministry of Education[EB/OL]. http://www.moe.gov.cn/srcsite/A07/moe_953/moe_958/201508/t20150817_200583.html, 2015-07-25:5.

⁵Ministry of Education of the People’s Republic of China. Opinions on Carrying Out Apprenticeship Pilot of Ministry of Education[EB/OL]. <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s7055/201409/174583.html>, 2014-08-25:1.

proposed in this document,⁶ hoping to provide students with various access to higher vocational education and training. Different from the general college entrance examination, the recruitment system of technical and vocational education and training is developing into a distinctive system allowing students make independent choices and schools make diverse admission. For higher vocational education and training, the college entrance examination is a reference describing students' literacy results. Meanwhile, additional skill achievement is needed to demonstrate students' level of general skills, career orientation, career potential and so on. For national model of higher vocational schools, provincial model of higher vocational schools and apprenticeship pilot schools, separate enrollment arrangement is permitted to be held before the college entrance examination. Based on the results of literacy test, skills test as well as comprehensive quality evaluation in senior high schools, these schools admit the best examinees. At the same time, students winning the prize in skills competition of vocational schools are entitled to enter schools without taking examinations.

8.2.2 Enhancing Teaching and Training Efficiency

Technical and vocational education and training schools cultivate talents by means of teaching and training. Hence, enhancing teaching and training efficiency is of significant importance in improving the quality of technical and vocational education and training. In practical terms, it is beneficial to train teachers' ability and adjust specialty structure so as to enhance teaching and training efficiency.

Considering that knowledge and information is accumulated and updated at a fantastic speed, it's necessary for teachers to renew their personal ability in time. Teacher training is regarded as a useful way to enhance teachers' professional and teaching capacity in this knowledge-explosion age. The document "Opinions on Improving Higher Education Quality of Ministry of Education" suggests that higher technical and vocational schools should attach importance to develop dual-competency teachers with both teaching qualification and professional qualification.⁷ The strengthening of teaching staffs construction is also highlighted in the document "National Medium and Long-term Educational Reform and Development Program (2010–2020)" and the "Decisions on Accelerating Vocational Education of the State Council". Enterprises and vocational schools are required to make cooperation on building the training base of dual-competency teachers; vocational schools should employ both full-time and part-time teachers with practical experience or high-level skills; teachers are asked to have enterprise practice regularly; enterprises staff are encouraged to hold the post of teachers in vocational schools and the teaching expe-

⁶Ministry of Education of the People's Republic of China. Opinions on Promoting the Recruitment System Reform of Higher Vocational Education[EB/OL]. <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s3258/201306/152732.html>, 2013-04:1.

⁷Ministry of Education of the People's Republic of China. Opinions on Improving Higher Education Quality of Ministry of Education[EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s6342/201301/xxgk_146673.html, 2012-03-16:5.

rience is a part of their performance evaluation. Except for teachers' teaching and professional capacity, their research and IT application ability should also be strengthened. The teacher training should be held every five years. In addition, the document "Opinions on Carrying Out Apprenticeship Pilot of Ministry of Education" points out the importance of teaching staffs construction in implementing apprenticeship. Considering that teaching and training task is taken by teachers and employees, it's necessary to promote the mutual engagement and research cooperation between schools and enterprises. To inspire teachers and employees, some rewards are given: teachers who offer technical service and make enterprise practice have more chance of job promotion; employees who teach students can enjoy teaching allowance.⁸

With the economic development, some newly industries and occupations emerge in the society. In China, the "Made in China 2025" strategy and "Internet Plus Action Plan" are in full swing, catalyzing some high and new technology industries; the "One Belt and One Road" is pushing the development of industrial clusters; some much-needed industries like agriculture, manufacture and services are being upgraded through the use of science and technology. Hence, vocational schools are required to adjust their specialty structure according to economic needs. The document "Opinions on Deepening Vocational Education and Teaching Reform and Improving the Quality of Talent Cultivation of Ministry of Education" indicates that newly professionals related to newly industrials should be built; current professionals related to traditional industries should serve the upgrading, low carbonization and intelligence of those industries. Moreover, it's necessary to build professional clusters in response of industrial clusters. For much-needed industries of China, building model professionals can drive the development of the whole industries. A dynamic regulation system of specialties will help to release warming information of specialties adjustment.⁹ In addition to economic needs, other factors like school conditions and local characteristics influence the specialty structure of vocational schools. Therefore, the documents "Opinions on Improving Higher Education Quality of Ministry of Education" highlights higher vocational schools' autonomy on specialty setting. Except specialties controlled by the nation, higher vocational schools are able to set other specialties independently.¹⁰

⁸Ministry of Education of the People's Republic of China. Opinions on Carrying Out Apprenticeship Pilot of Ministry of Education [EB/OL]. <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s7055/201409/174583.html>, 2014-08-25:4.

⁹Ministry of Education of the People's Republic of China. Opinions on Deepening Vocational Education and Teaching Reform and Improving the Quality of Talent Cultivation of Ministry of Education[EB/OL]. http://www.moe.gov.cn/srcsite/A07/moe_953/moe_958/201508/t20150817_200583.html, 2015-07-25: 3-4.

¹⁰Ministry of Education of the People's Republic of China. Opinions on Improving Higher Education Quality of Ministry of Education[EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s6342/201301/xxgk_146673.html, 2012-03-16:2.

8.2.3 *Improving Management and Evaluation*

Educational management and evaluation measures have great influence on teaching and training efficiency and effectiveness while teaching and training decides the final quality of technical and vocational education and training to some extent. In consequence, to improve educational management and evaluation measures is to improve the quality of technical and vocational education and training. Specifically speaking, educational management hopes to standardize the teaching and training process and educational evaluation is aimed at accessing and evaluating the teaching and training quality.

Improving the level of management helps to promote the connotative development of vocational schools and assure the quality of talent cultivation. In 2015, the Ministry of Education issued a document to improve educational management named “Action Plan on Improving Management of Vocational School (2015–2018)”. Focusing on the strengthening of management capacity, vocational schools are required to update management philosophy, complete management standards and innovate the operating system. There are several detailed references in management improving. *The school mission.* It’s required for school mission to meet the needs of economic development and students’ all-round development and to combine working with learning. *The institution system.* The headmaster is in charge of the school with representatives from enterprises, teachers, students and other social stakeholders are involved in the run of the school and teaching. *The school charter.* The school charter should be formulated on the basis of national laws and school characteristics. And with the help of information technology, all staff cooperate to work efficiently around the school charter. *The teaching team.* Full-time teachers should possess excellent teaching ability and proper practice experiences; part-time teachers should be strictly selected from enterprises to promote school teaching and training; the fund for training teachers should account for 5% of the school public fund per year. *The teaching management.* Specialties are related to industrial needs and curriculum contents are in accordance with professional standards; teaching activities and practice activities are scientifically arranged; students are equipped with favorable professional ethics and strong professional capacity. *The student management.* The student management system contains management of recruitment, registration, behaviors, activities as well as scholarship, employment, entrepreneurship and health. *The financial management.* There are special people and organizations in charge of school budget in technical and vocational schools. And the financial information is issued publicly pursuant to laws. *The research management.* Organizations and systems are built to manage teaching research; platforms and funds are provided to promote research activities; schools are encouraged to make cooperation with enterprises on scientific research and serve the society by means of scientific gains.¹¹

¹¹ Ministry of Education of the People’s Republic of China. Action Plan on Improving Management of Vocational School (2015–2018)[EB/OL]. http://www.moe.edu.cn/jyb_xwfb/s271/201509/t20150917_208782.html, 2015-09-17.

Educational evaluation is of significant meaning in describing the teaching and training quality as well as pointing out area for improvement. This evaluation is mainly manifested in the form of annual quality report. Higher schools are required to establish annual quality report publishing system¹² and this system is finally established in 2012. The annual quality report contains school conditions, student development, graduate employment, education reform and effect, government resumption, local community service, problems, future and so on. School conditions are showed in the form of “resource table” including indicators reflecting quality and quantity of teachers, equipment use and student practice (Table 8.1). Graduate employment is described by means of “score card” including indicators reflecting the quality and quantity of employment (Table 8.2).¹³ In 2015, the document “Action Plan on Improving Management of Vocational School (2015–2018)” suggests that secondary vocational schools should also establish the annual quality report system and this suggestion is emphasized in the document “Notice on Implementing Annual Quality Report System of Secondary Vocational Schools of Office of the Ministry of Education” An outline is provided as a reference for secondary vocational schools and it is composed of basic information (school scale, equipment and teaching staff), student development (student quality and employment quality), quality assurance strategies (specialty structure, quality monitoring system and teacher training), school-enterprise cooperation (cooperation program and student practice), social contribution (skilled personnel cultivation, social service and partner assistance), government performance (fund and policy), characteristics and creations, problems and improvement measures. The Ministry of Education and Department of Education of provinces are asked to design report column in the official internet to issue annual quality reports in different districts.¹⁴

8.2.4 *Completing External Guarantee Mechanism*

To improve the quality of technical and vocational education and training, it is necessary to complete external guarantee mechanism. Expenditure guarantee, resources support and legal insurance mainly constitute the external guarantee mechanism.

Expenditure is indispensable in school management, staff employment, school-house building, and equipment purchase, etc. Adequate funding for hardware and

¹²Ministry of Education of the People’s Republic of China. National Medium and Long-term Educational Reform and Development Program (2010–2020)[EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_838/201008/93704.html, 2010-07-29:16.

¹³Vocational & Adult Education Department of the Ministry of Education of the People’s Republic of China. Notice on Submitting Annual Quality Report of Higher Vocational Schools (2014)[EB/OL]. http://www.moe.gov.cn/s78/A07/A07_gggs/A07_sjhj/201311/t20131113_159343.html, 2013-11-11:3.

¹⁴Ministry of Education of the People’s Republic of China. Notice on Implementing Annual Quality Report System of Secondary Vocational Schools of Office of the Ministry of Education[EB/OL]. http://www.moe.edu.cn/srcsite/A07/s7055/201601/t20160126_228908.html, 2016-01-12:3–4.

Table 8.1 Resource table

Indicators		Unit	2012	2013
1	Student-teacher rate	–		
2	Dual-competency teacher-all teachers rate	%		
3	Enterprises practice time of full-time teacher	Day		
4	Specialty teaching time of part-time teacher from enterprise	%		
5	Equipment cost per student	Yuan/student		
6	Practice time within school training base per student	Hour/student		
7	Practice time in training base outside school per student	Day/student		

Table 8.2 Score card

Indicators		Unit	2012	2013
1	Employment rate	%		
2	Monthly income	Yuan		
3	Relevance of science, engineering, agriculture, medicine	%		
4	School satisfaction index	%		
5	Entrepreneurship proportion	–		
6	Employee satisfaction index	%		
7	Specialty monthly income	Yuan		

software construction acts as a strong guarantee for the quality improvement process of vocational schools. Hence, special funds have been allocated to support school running in recent years. The State Council has issued the document “Opinions on Increasing Education Input of the State Council” emphasizing the importance and urgency of education input. It is required that the ratio of education expenditure in the public expenditure should be feasibly increased, the source of funds should be broadened and the efficiency of fund usage should be enhanced.¹⁵ In 2014, the Ministry of Finance allocates 4 billion to improve school-running conditions of secondary vocational schools, up 23.5% over last year. These special funds are mainly used for infrastructure construction like training base building, schoolhouse reconstructing, teaching instrument and literature purchase.¹⁶ To improve school-running

¹⁵State Council of the People’s Republic of China. Opinions on Increasing Education Input of the State Council[EB/OL]. http://www.gov.cn/zw/gk/2011-07/01/content_1897763.htm, 2011-07-01:2-4.

¹⁶Ministry of Finance of the People’s Republic of China. Ministry of Education Allocates 4 Billion to Support Secondary Vocational Schools to Improve School-running Conditions[EB/OL]. http://jkw.mof.gov.cn/zhengwuxinxi/tourudongtai/201411/t20141115_1158559.html, 2014-11-15.

conditions is to help secondary technical and vocational schools improve the quality of education and then better serve the industrial needs of transforming and updating. Besides, to better improve the efficiency of fund expenditure, the Ministry of Finance issues the document “Opinions on Establishing and Completing the Average Appropriation System Directed by Reform and Performance and Accelerating Development of Higher Vocational Education”. In this document, higher vocational schools are required to realize the aim that the financial appropriation per student should reach the minimum standard of 12,000 by 2017 per year.¹⁷ Accordingly, the reward and supplement policy is formulated to increase educational investment and improve educational quality. There are two specific policies in this policy and the first policy is appropriation and supplement reward. The Ministry of Finance provides schools reaching the 12,000 aim with financial rewards sustainably. If schools haven’t reached 12,000 before the year 2017, they can also receive variable financial supplement from the Ministry of Finance. For schools who haven’t realized the 12,000 aim by 2017, the financial supplement will be stopped. The second specific policy is reform and performance reward. According to the performance of school on teaching reform, dual-competency teachers training, community service activities and so on, the Ministry of Finance appropriate funds to reward and encourage higher vocational schools.

The quantity and quality of educational resources influences the quality of talent cultivation. To increase the quantity and quality of educational resources, the high-quality resource sharing system is established. The document “Opinions on Improving Higher Education Quality of Ministry of Education” encourages higher schools to establish resource sharing platform under the cooperation with enterprises and research institutions.¹⁸ For higher vocational schools, they can combine with enterprises to build the library of teaching resource. The column of teaching resource library of technical and vocational education has been established in the website “Higher Technical and Vocational Education in China”. Higher vocational schools are able to build their own electronic library and share resources with other schools by means of the website. In order to assure the quality of candidate resource libraries, experts are invited to make evaluation before the candidate is confirmed and make detection afterwards. In addition to this website, a guide book called “Handbook on Building Teaching Resource Library of Vocational Education” is provided for vocational schools who want to build the library of teaching resource. In this handbook, the function of the library, building process, main content, management measures, construction funds and other factors are explained in detail. The library of teaching resource is positioned as a platform for personalized learning of students and flexible teaching of teachers. Schools wanting to build this kind of resource library

¹⁷Ministry of Finance of the People’s Republic of China. Opinions on Establishing and Completing the Average Appropriation System Directed by Reform and Performance and Accelerating Development of Higher Vocational Education[EB/OL]. http://jkw.mof.gov.cn/zhengwuxinxi/zhengcefabu/201411/t20141128_1161021.html, 2014-10-30:3.

¹⁸Ministry of Education of the People’s Republic of China. Opinions on Improving Higher Education Quality of Ministry of Education[EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s6342/201301/xxgk_146673.html, 2012-03-16:5.

can make voluntary application and then be accepted and supported by the Ministry of Education if they are excellent enough. Making sustainable update is necessary after the resource library is accepted. The percentage of the newly-updated resources should account for 10% at least.¹⁹ The main contents of the resource library include: specialty introduction, education plan, teaching environment, online courses, training programs and evaluation system. As for the management measure, a national platform called “vocational education teaching resources library operating and monitoring platform” has been established to analyze data relevant to resource library building and applying. In order to better promote the development of this teaching resource library the central government offers special funds devoted to curriculum development, software design, enterprises case collection, expert consultation and so on. What’s more, vocational schools, enterprises or local governments raise project funds by themselves.

Besides the expenditure guarantee and resources support mentioned above, the legal insurance also takes a place in the quality improving process of technical and vocational education and training. In spite of the fact that the vocational education law is still incomplete, the importance and necessity of legislation has not been totally realized in China. The document “National Medium and Long-term Educational Reform and Development Program (2010–2020)” has indicated that the vocational education law should be amended based on the needs of economic development and educational reform.²⁰ The document “Decisions on Accelerating Vocational Education of the State Council” also lays stress on accelerating the pace of the amendments to vocational education law.²¹

8.3 Cases of Transformation of Technical and Vocational Education

8.3.1 *Cases of Increasing the Educational Vitality*

The specific measures used to increase the educational vitality include involving enterprises into school running and reforming the recruitment system. What has been done in involving enterprises into school running is reflected in the annual

¹⁹Ministry of Education of the People’s Republic of China. Handbook on Building Teaching Resource Library of Vocational Education[EB/OL]. http://www.moe.gov.cn/s78/A07/A07_gggs/A07_sjhj/201605/t20160506_242282.html, 2016-05-05:4.

²⁰Ministry of Education of the People’s Republic of China. National Medium and Long-term Educational Reform and Development Program (2010–2020)[EB/OL]. http://www.moe.gov.cn/jyb_xwfb/s6052/moe_838/201008/t20100802_93704.html, 2010-07-29:21.

²¹The State Council of the People’s Republic of China. Decisions on Accelerating Vocational Education of the State Council[EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_1778/201406/170691.html, 2014-05-02:6.

quality report of enterprises and vocational schools. As for the recruitment system reform, some provinces and districts have already taken actions.

There are a number of annual quality reports listed in the website titled “Higher Technical and Vocational Education in China”. In 2016, 273 enterprises from 28 provinces and districts exhibit their annual report in this website. The annual quality report from Ningbo Haitian Group Corporation, making cooperation with Ningbo vocational schools, is selected as an example. Engaging in plastic machinery production, Ningbo Haitian Group Corporation has established partnership with Ningbo Vocational School on teaching, training and employment since 2002. In 2007, Haitian College is built within this vocational school to nurture electro mechanics talents. At present, acting as Ningbo Vocational School’ board, Ningbo Haitian Group Corporation involves in school running from the aspects of resource commitment, order-type cultivation and dual-competency teachers training. The Corporation inputs 6,000,000 for the purchase of numerical control machine and 2,020,000 for teaching equipment. What’s more, a teaching practice building was built with the donation as high as 10,000,000 yuan from this Corporation and a training base is established under the school-enterprise cooperation. To promote the order-type cultivation, 69 staff have participated in school teaching, reaching 1280 teaching hours from 2012 to 2015. Under the order-type cultivation model, the vocational school and enterprise draw up the training scheme, curriculum standards as well as curriculum contents together. Then teachers from the enterprise give guidance on practical operation while teachers from the school teach professional knowledge at school. Afterwards, students begin to practice in the enterprise with the help of teachers both from the school and the enterprise. When students are able to operate independently, a suitable job will be offered to them with a practice supervisor. From 2012 to 2015, 237 students have participated in Haitian order-type class and got relevant diploma. The last school-enterprise cooperation is made in the form of dual-competency teachers training. In order to strengthen teachers’ professional ability, some special research groups like numerical control machine research group are established for teachers to make deep research on industrial production. Besides, teachers spend their spare time practicing in Haitian Corporation. During teachers’ practicing time, production problems are found and solved by research groups.²²

The recruitment reform has been tried by Jiangsu province and Shanghai. Complying with the document “Opinions on Promoting the Enrollment System Reform of the State Council”, Jiangsu province has formulated “Jiangsu Enrollment System Reform Implementation Plan”. The enrollment reform of higher vocational schools is part of this whole reform implementation plan. By the end of 2014, 35 higher vocational schools in Jiangsu province have implemented the separate entrance recruitment reform. Students taking the separate entrance examination accounts for 20% of all students. In 2015, another 2 higher vocational schools start to participate in the

²²Ningbo Haitian Group Corporation. The 2016 Annual Quality Report of Ningbo Haitian Group Corporation[EB/OL]. http://www.tech.net.cn/web/rcpy/articleview_sch.aspx?id=4856, 2016-01.

separate entrance recruitment reform.²³ The separate entrance examination contains literacy examination and skills assessment. The former one is held by Jiangsu Education Examination Authority or higher vocational schools while the latter one is held by higher vocational schools themselves. Students who have passed the literacy examination can attend the skills assessment. What's more, students are not allowed to attend other forms of college admission once admitted. The separate entrance examination is arranged before college entrance examination. In addition to Jiangsu province, Shanghai issues "Implementation Plan on Promoting the Enrollment System Reform of Higher School" as well. In this implementation plan, the separate entrance examination is stressed as the evaluation of cultural quality and vocational skills.²⁴ As the main enrollment channel, the separate entrance examination is held before college entrance examination to increase the attraction of higher vocational schools.

8.3.2 Cases of Enhancing Teaching and Training Efficiency

In order to enhance teaching and training efficiency, vocational schools adjust the specialty structure to better equip students with knowledge and skills required by the social economy, and accelerate the process of training dual-competency teachers with the assistance of enterprises to strengthen teachers' professional and teaching ability.

The Ministry of Education has issued some documents to normalize and assist vocational schools in adjusting the specialty structure. The document "Higher Vocational Education Specialty Management Measures of General Higher School" demonstrates rules and regulations in specialty setting and the document "Category of Higher Vocational Education Specialty of General Higher School 2015" lists the specific majors of technical and vocational education. Higher vocational schools are required to timely adjust their specialty structure based on these documents. According to the needs of social economy, the specialty type is added every year and the specialty category is revised every 5 years. In the specialty category, there are 19 sorts of specialties, 99 professional categories, 748 majors and 291 relevant jobs.²⁵ From the comparison table of new and former specialties, it's not difficult to find that the change of majors reflects the development of economics. Some new majors

²³Jiangsu Provincial Education Examination Authority. Notice on Implementing Separate Entrance Reform of Higher Vocational Schools in 2015 of Department of Education of Jiangsu Province[EB/OL]. http://www.jseea.cn/contents/channel_26/2014/12/1412311159766.html, 2014-12-31.

²⁴Shanghai Municipal People's Government. Implementation Plan on Promoting the Enrollment System Reform of Higher School[EB/OL]. <http://www.shmec.gov.cn/html/xgk/201409/420032014012.php>, 2014-09-18:3.

²⁵Ministry of Education of the People's Republic of China. Revision Note of Category of Higher Vocational Education Specialty of General Higher School 2015[EB/OL]. http://www.moe.edu.cn/srsite/A07/moe_953/moe_722/201511/t20151105_217877.html, 2015-10-28:1.

appear because of the needs of economic transition. The majors “pollution remediation and ecological engineering” and “resource utilization and management” cater to needs of sustainable economic development. These majors are aimed at increasing resource usage efficiency while decreasing pollution emissions with the application of new science and technology. At the same time, some majors are no longer there because they are not fit in with the development of social economy. The majors “forest logging engineering” and “forest by-product processing” are cancelled in that forest resource is a kind of half-regenerate source which should be well protected and alternative resources are exploited to meet the needs of industrial production. In addition to higher vocational schools, secondary vocational schools are provided with the specialty category “Teaching Standard of Secondary Vocational School” in 2014. In this category, there are 14 professional categories and 95 majors related to economics, medicine, information technology, manufacturing, agriculture and so forth.²⁶ It is convenient for secondary vocational schools to adjust specialty structure and design teaching activities with the reference of this specialty category.

The excellent teacher cultivation program has started since 2014 to train more dual-competency teachers. Programs focusing on teachers of secondary vocational schools are held by technology colleges like Tianjin Vocational and Technology Normal University, Jilin Engineering Normal University, Guangdong Technology Normal University and so on. Besides, some universities like Tongji University, Hubei Technology University are involved in teacher training programs as well.²⁷ These programs focus on the theory and practice of how to cultivate high-qualified teachers in today’s background. Moreover, vocational schools have made great effort to train dual-competency teachers, taking Ningbo Yinzhou Vocational School as an example. A special teacher training mode called “One Base, Two Trains and Five Entrances” is created by this vocational school. “One Base” program aims to increase teachers’ knowledge accumulation as well as strengthen teaching and research ability through training. “Two Trains” offers new teachers induction training while backbone teachers promoting training. As for “Five Entrances”, it includes: teachers joining industry associations to know the industrial needs, teachers taking part in professional skills competition to strengthen teaching abilities, teachers going into enterprises to make practice, teachers entering universities to have further studies and experts coming to schools to pass on new theories. Through this unique model, teachers’ capacity is enhanced and 85% of teachers have developed into dual-competency teachers.²⁸

²⁶General Office of the Ministry of Education of the People’s Republic of China. Teaching Standard of Secondary Vocational School[EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_721/201405/169178.html, 2014-04-30.

²⁷Teacher Department of Ministry of Education of the People’s Republic of China. Selection Result of Excellent Teacher Cultivation Program[EB/OL]. http://www.moe.gov.cn/s78/A10/A10_gggs/s8471/201411/t20141121_181015.html, 2014-11-20:1.

²⁸Chinese Vocational and Technical Education. Recreation Forging Upgraded Vocational School[EB/OL]. <http://www.cnki.com.cn/Article/CJFDTotal-ZONE201404014.htm>, 2014(04):29.

8.3.3 Cases of Measures to Improve Management and Evaluation

Educational management and evaluation measures contain a series of specific methods. In the document “Action Plan on Improving Management of Vocational School (2015–2018)”, it points out some main references including teaching quality management on the process of educational management improving. And the inner quality diagnosis institution is what higher vocational schools have done on teaching quality management. For educational evaluation, the implementation cases of annual quality report demonstrate vocational schools’ efforts.

In order to improve teaching quality management of vocational schools, the Ministry of Education issues the document “Notice on Establishing Diagnosis and Improvement Institution in Vocational Schools of the General Office of the Ministry of Education”. Based on school philosophy and educational objective, vocational schools are asked to find and solve problems by themselves in these areas like specialty structure, teaching troops, curriculum system, teaching activity, management institution, school-enterprise cooperation and so on.²⁹ Then another document called “Instruction on Diagnosis and Improvement of Inner Quality Assurance System in Higher Vocational Schools” is issued to guide the establishing of diagnosis and improvement institution in higher vocational schools. With the aid of this instruction, higher vocational schools are able to operate the diagnosis and improvement institution step by step. Independently established higher vocational schools should complete the diagnosis of quality assurance system at least every 3 years while newly established schools implement inner diagnosis according to the regulations made by educational administrative department. Higher vocational schools make diagnosis on the operating conditions of inner quality assurance system and add result of the diagnosis to the annual quality report. The content of the diagnosis includes: the philosophy, organization, staff, institution, implementation and information collection of quality assurance; construction and diagnosis of specialty; quality assurance of curriculum; construction and diagnosis of teaching staff; plan and diagnosis of cultivation program; quality assurance of inner and external environment; monitoring of emergence and results of quality assurance strategies.³⁰ These factors mentioned above have been dispersedly present in vocational schools’ annual quality reports and would be more systematically exhibited.

The website “Higher Technical and Vocational Education in China” lists the annual quality reports of higher vocational schools since 2011. The number of voca-

²⁹General Office of the Ministry of Education of the People’s Republic of China. Notice on Establishing Diagnosis and Improvement Institution in Vocational Schools of the General Office of the Ministry of Education[EB/OL]. http://www.moe.edu.cn/srcsite/A07/moe_737/s3876/201507/t20150707_192813.html, 2015-06-23:1.

³⁰Vocational & Adult Education Department of the Ministry of Education of the People’s Republic of China. Instruction on Diagnosis and Improvement of Inner Quality Assurance System in Higher Vocational Schools[EB/OL]. http://www.moe.edu.cn/s78/A07/A07_gggs/A07_sjhj/201512/t20151230_226483.html, 2015-12-30:3-15.

tional schools from 32 provinces and districts submitting annual quality reports increases year by year: from 236 in 2011, 585 in 2012, 1146 in 2014, 1277 in 2015 to 1549 (1276 vocational school and 273 enterprises) in 2016. Some enterprises taking part in vocational education and training submit annual quality report as well in 2016. Similarities and differences exist within and among provinces every year in the number of vocational schools submitting reports: vocational schools submitting reports become more and more almost in every province; there are 84 vocational schools in Jiangsu province submit their reports while only 1 in Tibet in 2016. Besides, the content of vocational schools' annual quality report can be summarized as: general situation, students' development, educational reform, social service, policy support, challenges and attachment (score card, resource table, service table and performance table). For enterprises' annual quality report, it is made up of basic facts of enterprise and school, participating in school running, resource input, participating in teaching, benefits of school-enterprise cooperation, social service and assurance system.

8.3.4 Cases of Completing External Guarantee Mechanism

To complete external guarantee mechanism, much has been done to strengthen the expenditure guarantee and increase the resource input.

Expenditure guarantee is a necessary material base for quality improving of vocational education and training. And the central government has tried hard to increase investment. In 2014, the total investment of vocational education has reached 342.4 billion, which represents a 42.2% increase over 2010, with the average growth rate per annum accounting to 10.1%. And from 2010 to 2014, the central expenditure for secondary vocational education increases 54.9 billion, risen by 40.6% with 9.7% per annum; the investment in higher vocational education increases 46.6 billion, risen by 44.4% with 10.5% per annum.³¹ In order to support the training base establishing, the central government has invested a large amount of money since 2004. And the total investment has increased from 11,870 in 2004 to 140,000 in 2013.³² In addition to central government, local governments also fulfill their duty to assure appropriation per student. By the end of 2014, 23 provinces and districts set the appropriation standard per student of higher and secondary vocational education. In 2013, within public finance budget per student in secondary vocational schools, operation expenses for education reach 8784.64, 16.1% over 2012; public expenses reach 3578.25, 20.2% over 2012. And 40% of students in secondary vocational schools as well as over 25% of students in higher vocational schools are able to obtain fellow-

³¹Ministry of Education of the People's Republic of China. Mid-Stage Assessment of National Education Plan (2010–2020)—Appraisal Report of Vocational Education[EB/OL]. http://moe.edu.cn/jyb_xwfb/xw_fbh/moe_2069/xwfbh_2015n/xwfb_151202/151202_sfcl/201512/t20151202_222297.html, 2015-12-02:3.

³²Ministry of Education of the People's Republic of China. Construction Achievement of Training Base Supported by the Central Finance[EB/OL]. http://www.moe.gov.cn/s78/A07/zcs_left/zcywl_m_zhgg/s3060/s3062/201412/t20141222_182161.html, 2014-12-22.

ship. Besides, 91.5% of students from rural areas, poor families and students whose majors are related to agriculture in secondary vocational schools enjoy the tuition waiver.³³ More speculatively, secondary vocational schools in 9 provinces including Shanxi, Inner Mongolia, Jiangsu, Fujian, Guizhou, Qinghai, Chongqing, Ningbo, Xiamen have exempted tuition fee for all students. Special financial subsidies are used to pay the tuition fee for students and the subsidies range from 2000 to 6500 per student.³⁴

The library of teaching resource has been built in many vocational schools to increase and share resources. The Ministry of Education issued a program list of teaching resource library applied by vocational schools almost every year since 2010. In 2010, the applications to build 11 libraries of teaching resource by 12 vocational schools was accepted by the Ministry of Education and Finance.³⁵ The specialties involved include numerical control technology, architectural engineering, accounting and so on. And only 2 vocational schools build 1 teaching resource library together; in 2011, 8 libraries of teaching resource applied by 8 vocational schools were accepted.³⁶ Specialties cover software technology, electronic business, medical preparation and so forth; in 2014, there are 14 libraries of teaching resources held by 16 vocational schools and 1 teaching guide committee.³⁷ These teaching resource libraries cover the specialties like horticulture, international trade, food quality testing, digital media, electric automation and so on. Vocational schools like Liaoning Agriculture Vocational School and Jiangsu Agriculture and Forest Vocational School cooperate to build the horticulture teaching resource library. The footwear design teaching resource library is built by Wenzhou Vocational School with the help of Textiles and Garments Teaching Guide Committee. Other vocational schools such as Zibo Vocational School, Wuxi Vocational School choose to build the teaching resource library by themselves; then in 2015, 35 vocational schools

³³Ministry of Education of the People's Republic of China. Mid-Stage Assessment of National Education Plan (2010–2020)—Appraisal Report of Vocational Education[EB/OL]. http://moe.edu.cn/jyb_xwfb/xw_fbh/moe_2069/xwfbh_2015n/xwfb_151202/151202_sfcl/201512/t20151202_222297.html, 2015-12-02:4.

³⁴People's Daily. 9 Secondary Vocational Schools Exempt Tuition Fee[EB/OL]. http://www.moe.gov.cn/jyb_xwfb/xw_fbh/moe_2069/s7135/s7174/s7177/201302/t20130221_147736.html, 2013-02-21:1.

³⁵Vocational & Adult Education Department of the Ministry of Education of the People's Republic of China. Acceptance Result of 2010 Teaching Resource Library Programs of Higher Vocational Education[EB/OL]. http://www.moe.gov.cn/s78/A07/A07_gggs/A07_sjhj/201301/t20130131_147396.html, 2013-01-30.

³⁶Vocational & Adult Education Department of the Ministry of Education of the People's Republic of China. Acceptance Result of 2011 Teaching Resource Library Programs of Higher Vocational Education[EB/OL]. http://www.moe.gov.cn/s78/A07/A07_gggs/A07_sjhj/201310/t20131011_158260.html, 2013-10-09.

³⁷Ministry of Education of the People's Republic of China. Notice on Confirming Construction Program of 2014 Teaching Resource Library of Vocational Education of Ministry of Education[EB/OL]. http://www.moe.gov.cn/srcsite/A07/s7055/201407/t20140702_171249.html, 2014-06-26.

and 2 teaching guide committees applied to build 22 teaching resource libraries.³⁸ Involving specialties contain energy, communication technology, forestry, costume design, special education, legal secretary and so on. Compared with 2014, more vocational schools and teaching guide committees collaborate to build teaching resource libraries. For example, Shenzhen Vocational School, Nanjing Information Vocational School and Shijiazhuang Post Vocational school build the information technology teaching resource library together; Shandong Technology Vocational School, Hangzhou Vocational School and Textile and Garments Teaching Guide Committee co-establish the costume design teaching resource library. It's not hard to find that more and more vocational schools apply to build teaching resource library from 2010 to 2015. Besides, the number of interschool cooperation programs increase year by year.

8.4 Construction of Modern Apprenticeship as a Supplement to the School Based Technical and Vocational Education System

The effectiveness and sustainability of technical and vocational education system are closely interrelated to the innovation and research in education. Since the implementation of the so-called opening and reform policy, changes have taken place in Chinese economic and social structure. The development of technical and vocational education stagnates and lags behind the economic and social development. Technical and vocational education research tries to assume the role of an anticipatory initiator, a competent contributor and a constructively critical evaluator of innovation processes in the development of technical and vocational education system. It's necessary to have a presentation of innovation research projects in the past years.

8.4.1 Institutional Barriers to Skilled Personnel Training

Up to now, China has been focusing on a school-based vocational education. Despite dramatic quantity expansion in the recent decade, the quality and qualification of skilled personnel still fall short to satisfy the needs of economic and technological development. One of the most important reasons is that a purely school-based vocational education approach does not satisfy the demand for skilled personnel in production and service. It seems too weak to identify, evaluate and promote work

³⁸Ministry of Education of the People's Republic of China. Notice on Confirming Construction Program and Bonus Program of 2015 Teaching Resource Library of Vocational Education of Ministry of Education[EB/OL]. http://www.moe.gov.cn/srcsite/A07/moe_737/s3877/201507/t20150727_195705.html, 2015-06-30.

process knowledge learning that is totally dependent on the school-based education. The approach of “school-enterprise cooperation” should be an effective solution.

In recent years China has exerted great efforts on school-enterprise cooperation in technical and vocational education. In 2005, the State Council issued the Decision on Vigorously Developing Vocational Education and decided to “adopt an approach of work-learning combination and school-enterprise cooperation to strengthen interaction between schools and enterprises, so as to reform current school-based personnel training model”. Following the instructions, technical and vocational education institutions made attempts in the practice:

- The central and regional governments and trade associations issued a wide range of policies and regulations to support school-enterprise cooperation, and organized various types of school-enterprise cooperation programs and school-enterprise dialogues.
- Vocational schools, colleges and enterprises deepened their cooperation in curriculum development and teaching-learning arrangement. Such cooperation could be categorized by temporal, spatial and organizational elements into the following types:
 - Phase training organization according to school years, e.g., “2 years in schools/colleges + 1 year in enterprises”, different training phases in different learning venues;
 - Work-study program, work and study part time alternatively in technical and vocational institutions and enterprises;
 - Flexible teaching and learning arrangement;
 - School training according to enterprises’ specific requirements;
 - Construction of in-factory and work-study learning facilities;
 - Cooperative training directed by enterprises;
 - Workshops serves as teaching practice;
 - Courses replaced by those developed by training service centers³⁹ (Yu 2009).
- “Technical and vocational education groups” is a new model of school-enterprise, which is composed of technical and vocational institutions and their cooperative enterprises. It aims to:
 - Enable closer interlink (in terms of specialty setup, curriculum development and implementation of training programs) and better resource sharing including training personnel and training infrastructure among different vocational institutions;
 - Create a network between enterprises and technical and vocational institutions, in which vocational institutions provide enterprises with services of technology transfer and consulting, new product developing, and enterprises provide vocational institutions with training facilities, opportunity of apprenticeship, part-time trainers/lectures and participation in training program development;

³⁹Yu Zuguang (2009). School-Enterprise Cooperation Mechanism in Technical and Vocational Education. Chinese Vocational and Technical Education. (4): 5–11.

- Promote employment of graduates and co-develop business projects.

Examples mentioned above are ideal models for school and enterprise collaborations. In reality, despite painstaking efforts of all institutions involved, there are numerous challenges in delivering these models, e.g. the lack of interests of the enterprises and the lack of the long-term sustainable school-enterprise cooperation mechanism in the overall sense.

8.4.2 Problems in School-Enterprise Cooperation

Despite awareness of the importance of school-enterprise cooperation, there still lacks legal and institutional incentives or encouragement for such cooperation. Existing laws in the fields of economic administration do not address technical and vocational training and school-enterprise cooperation; while the laws in education such as the Vocational Education Law only provide general principles. The urgent need is for specific regulations and suggestions from local governments or sector administration, but it appears helpless for not having enough legally binding effect upon technical and vocational institutions and enterprises.

Practice shows that there are some obstacles to the internship. Technical and vocational institutes cannot provide the enterprises with a systematic training plan for the internship, neither do they manage nor monitor the ‘working’ element from the pedagogical perspective. On the other hand, enterprises tend to prioritize the economic benefits of their own and students become low-paid skilled labor. Other problems occurred from the school-enterprise cooperation including the big gap between the learning content and the actual needs of the enterprises, under-skilled teachers, and failure of the school’s organizational regulations to meet the needs of the cooperation. Therefore, with pilot projects, school-enterprise cooperation can achieve satisfactory results when efficient governance system and implementation competence are under way.

8.4.3 Modern Apprenticeship: A Supplement to the Vocational Education System

The rediscovery of the value of modern apprenticeship has been one of the most significant trends in technical and vocational education in recent years, and has prompted an array of research and development projects in China⁴⁰ (Zhao et al. 2011). According to the National Medium- and Long-Term Educational Reform and Development Guidelines of the Chinese central government, more work should be

⁴⁰Zhao, Z., Rauner, F., Hauschildt, U. (Eds.) (2011). Assuring the Acquisition of Expertise. Apprenticeship in the Modern Economy. Beijing: Foreign Language Teaching and Research Press.

done to “establish and improve a government-led, industry-guided and enterprise-participating educational mechanism, to develop school-enterprise cooperation regulations, and to promote the institutionalization of school-enterprise cooperation”⁴¹ (MoE 2010). It is of strategic importance to establish modern apprenticeship and bring it under government regulation. The *Decision of the State Council on Accelerating the Development of Modern Vocational Education* (State Council 2014) identifies pilot programs of modern apprenticeship as an important initiative to promote personnel training model innovation. Under this context, there is an increasing number of technical and vocational institutions carrying out various forms of modern apprenticeship pilot experiments.

Up to now, China is probably one of the few counties in the world that hasn't establish an official apprenticeship system, but China does have a certain kind of apprenticeship tradition, for example, the practice of the “half work, half study” program. On the one hand, the core concept of modern apprenticeship is deeply rooted in the society; on the other hand, informal apprenticeship exists continuously, nationwide. It is necessary and possible to establish modern apprenticeship in China.

Recent attempts by the MoE and the MoHRSS to establish modern apprenticeship has many new features compared to traditional educational structure: more stakeholders, innovative and standardized operating mechanism, wider coverage (including students of technical and vocational schools and colleges, graduates of universities). It integrated apprenticeship into school-based system and third-party training agencies (or intermediaries).

The establishment of modern apprenticeship requires experiments in the following aspects:

- Corresponding laws at national level should be made to acknowledge the legitimacy of apprenticeship.
- Regulations should be designed both at national and regional level to assure implementation of coordinated and consistent apprenticeship, to monitor and evaluate the school-enterprise cooperation, to satisfy the enterprises' needs, and to achieve high public acceptance and attractiveness of apprenticeships.
 - Relevant dedicated and specialized organization and service should be set up, apprenticeship centers are directly targeted to apprentices.
 - More authorities should be delegated to trade associations with respect to apprentice employers' eligibility management, instruction arrangement, advisory services and school-enterprise dispute resolution.
 - Incentive measures should be developed to encourage small and medium enterprises to offer apprenticeships and let them know such offering is not only beneficial to their competitiveness but also economically viable. The signing of an apprenticeship contract also helps to protect apprentices' fundamental rights, e.g. having rights to receive education, workplace protection and social welfare.

⁴¹Ministry of Education (2010). National Medium- and Long-Term Educational Reform and Development Guidelines. http://www.china.com.cn/policy/txt/2010-03/01/content_19492625_3.htm. Accessed 05 April, 2015.

Since 2014, the MoE has organized a number of pilot projects to establish a “modern apprenticeship system”. In 2015, the MoHRSS and the Ministry of Finance (MoF) issued the document the *Start of a Pilot Scheme for a New Type of Enterprise-based Apprenticeship System* (RenSheTingFa [2015] 34), launching a pilot program to create an Enterprise-based New Apprenticeship System. According to the notice of MoHRSS and MoF, the establishing of the New Type of Enterprise-based Apprenticeship is an important content of the strategy for thoroughly implementing a strong and talent-rich country and for enabling that innovation drives development. Modern apprenticeship is now developing under the stark improvement of the Chinese government.

These pilot projects are trying to solve the following tentative problems:

- Modern apprenticeship is of great complexity (diverse participation of individual companies, varying ownership structures, weak employer organizations, prevailing short-term and monetary orientation, vertically and horizontally differentiated public administration, education and training providers inexperienced with “real” apprenticeship, complex regulatory). New policies and measures at the local, provincial and national level should give a strong advisory and technical support structure which is recognized by all authorities.
- It is not enough, that only the political and administrative authorities, e.g. the MoE and MoHRSS formulate public statements, which calls for a closer collaboration among education and training institutions and enterprises. There is little technical assistance package available for those companies who are willing to embark on apprenticeships. These projects try to offer specific services to students and their parents to understand the connotation and significance of the apprenticeship.

8.4.4 Pending Issues to Be Solved

These projects and measures need to be worked together with enterprises. Whether the framework is workable or not for the expansion of apprenticeship lies in the participation of enterprises. In fact, enterprises should make additional efforts to change their traditional concepts. Some enterprises worry about potential problems, even if the research shows that apprenticeship is cheaper than other types of training, for example, if they lose the staff they have trained to their competitors. How to introduce the policy of tax reductions and other types of incentives for small and medium-sized enterprises to engage in apprenticeships, it needs the involvement and commitment of the executives and staff of the related enterprises, and the support from economic policies. This has greatly surpassed the traditional dimension of “education”.

In order to make the apprentice able to adapt to the challenges of a modern economy and society, which is gradually upgrading to higher levels of sophistication (higher value-added in the design, production and marketing process), there should be a group of technical organizational agencies available outside, like the chamber

of commerce and industry etc. It is a huge challenge to develop and establish these institutional infrastructures⁴² (Risler and Zhao 2014).

From the perspective of education policy, the government should issue more preferential policies in favor of the youth, such as migrant workers of the new generation. Through the apprenticeship, graduates are able to obtain occupational qualification certificates, and at the same time, they have the opportunity to study in colleges or universities. In the past few years, some pilot projects have been conducted in national hi-tech industry innovation promotion bases, more and more students receive practical training in this way.

8.5 Achievements in Technical and Vocational Education Attained in the Past Five Years

Based on the formulation and implementation of relevant policies, some achievements have been made in the past five years. Educational resources have been largely enriched by means of increasing educational investment, building libraries of teaching resource and developing school-enterprise cooperation. From 2011 to 2014, the investments on education increased from 2596 to 4661 in secondary vocational schools per student and from 6634 to 7897 in higher vocational schools.⁴³ By 2015, there are 60 libraries of teaching resource for different specialties including hospitality management, electrical automation, biotechnology, preschool education, accountancy, embroider, crop production and so on. Each library of teaching resource contains online courses, professional research, virtual training, material database, enterprise cases and other resources related to teaching, training and learning. All these resources are listed in the website “The Library of Teaching Resource of Technical and Vocational Education” and open to everyone. Hence, it is possible for any person to learn anywhere and anytime with the access to internet.

Teaching staff of vocational schools have been optimized. In recent years, some favorable changes happen to teachers of vocational schools in the aspect of quantity and quality. According to the report “China Education Overview” issued by the Ministry of Education, the student-teacher ratio of secondary vocational schools decreases from 25.8:1 in 2011, 24.7:1 in 2012, 23.0:1 in 2013 to 21.3:1 in 2014⁴⁴; the student-teacher ratio of higher vocational schools shows a descending trend basically,

⁴²Risler, M. & Zhao Zhiquan. (2014). Apprenticeship and Small and Medium-sized Enterprises—The China Case. Regional Association for Vocational Teacher Education in Asia, Chiang-mai. <http://ravte.asia/study-8-now-online-apprenticeship-and-small-and-medium-sized-enterprise-s-the-china-case/>. Accessed 5 April, 2015:57–60.

⁴³Ministry of Education of the People’s Republic of China. 2012 China Education Overview[EB/OL]. <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s5990/201111/126550.html>, 2013-10-23:7.

⁴⁴Ministry of Education of the People’s Republic of China. 2014 China Education Overview[EB/OL]. http://www.moe.gov.cn/jyb_sjzl/s5990/201511/t20151125_220958.html, 2015-11-25:7.

from 17.3:1 in 2011, 17.2:1 in 2012, 17.1:1 in 2013 to 17.6:1 in 2014.⁴⁵ The decrease of student-teacher ratio means that students have more chance to enjoy teaching resources. Besides, the proportion of dual-competency teachers in secondary vocational schools increases year by year: from 23.7% in 2011 to 27.6% in 2014.⁴⁶ In higher vocational schools, teachers with graduate degrees increase from 35.4% in 2011 to 42.3% in 2014; teachers with senior professional titles present a rising tendency from 28.9% in 2011 to 29.4% in 2014.⁴⁷

The employment rate of students has been enhanced with the efforts of governments, schools and enterprises. The central government appropriates funds for building training base. And a large number of technical and vocational schools have built training base within or out of school to equip students with practical skills. Besides, enterprises develop order-type cultivation programs so as to help students learn from real works. From the annual quality report of higher vocational schools, it's not difficult to find that more students are able to find jobs or become self-employed and that employers are satisfied with students from vocational schools. In general, data like monthly income, entrepreneurship rate and employer satisfaction rate recorded in the score card are in the rise year by year.

The quality assurance system of technical and vocational education and training has been promoted in consideration of three factors. First is the establishing of quality criteria system. The Ministry of Education has formulated and issued teaching criteria, specialty categories and specialty management measures of secondary and higher vocational schools. These documents are used to regulate the conditions and procedures of specialty setting as well as standardize the specialty teaching process. Second is the implementing of internal quality management institutions. The institution of vocational schools' annual quality report has been normalized while the inner diagnosis and improvement institution has taken initial shape. Last is the completing of external quality mechanism. The financial investment in vocational education and training reveals a general trend of increase and more excellent resources are open to people through network.

⁴⁵Ministry of Education of the People's Republic of China. 2012 China Education Overview[EB/OL]. <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s5990/201111/126550.html>, 2013-10-23:5-7.

⁴⁶Ministry of Education of the People's Republic of China. 2013 China Education Overview[EB/OL].http://www.moe.gov.cn/jyb_sjzl/s5990/201503/t20150331_186797.html, 2015-03-31:5-7.

⁴⁷Ministry of Education of the People's Republic of China. 2014 China Education Overview[EB/OL].http://www.moe.gov.cn/jyb_sjzl/s5990/201511/t20151125_220958.html, 2015-11-25:5-7.

Summary

Technical and vocational education in China has gone through several phases since the modern system was created in 1949: to cultivate urgently needed talents for the construction of new China, work-study system in the 1960s, and in the 1980s, to promote vocational education as an important foundation for the economic development of the country. In the 21st century, technical and vocational education has triumphed in what might be described as “a great leap forward” that parallels China’s economic prosperity. The most important symbol is that the world’s largest framework of technical and vocational system has been built in China. According to the mid-term assessment report of technical and vocational education in 2010 issued by the Ministry of Education, from the year 2010 to 2015, the enrollment of secondary vocational schools took up about 45% of senior high school level while the enrollment of higher vocational colleges in 2014 reached 3.3798 million, taking up 46.9% in the enrollment of higher education. There are 10 million in-school students. Technical and vocational colleges serve as an important base for cultivating high-quality talents of technology and provide nearly 10 million talents with techniques, which taking up 60% of the newly-employed workers, improving the quality of labor force in a large scale.¹

By the middle of this century, China will complete the fundamental change from a country with the biggest vocational education scale to a country with the most developed vocational education. In this process, the gradual accumulation and leap are mutually intersected and weaving, which was embodied as the breakthrough stages. By 2020, modern technical and vocational education system with Chinese characteristics will be basically built, as a kind of complete and functional education type, it mainly embodies the characteristics of “big” and “full”. By 2030, efforts will be made to realize modernization of the system of governance and management capabilities, further perfect the system on the basis, form a more mature and stereotypes of system and mechanism, and improve the basic ability,

¹National Education Reform and Development of Long-term Planning Programs (2010–2020).

innovation ability, service ability and competition ability of vocational education comprehensively, which mainly reflected the “good” and “strong” characteristics. By the year 2050, vocational education and the whole education will have achieved the strategic objectives and China will become a country with developed technical and vocational education in the world.

References

- Bao, H. (2012). Development of teacher training in China. In *International Research and Training Centre for Rural Education (INRULED)*. <http://www.inruled.org/iERD/>. Retrieved February 5, 2014.
- Bao, Y. (2007). Problems in the building of higher education teachers and the countermeasures. *Journal of Tonghua Normal College* (12).
- Chen, X. (1999). *Education management*. Beijing: Beijing Normal University Press.
- Deng, Y. (2002). Curriculum reform is the safeguard to improve the development of secondary vocational education. *Forum of Vocational Education* (8).
- Dong, B. (2006). *Study on higher technical and vocational education*. Nanchang: Jiangxi College Publishing House.
- Dong, B. (2006). *Higher vocational pedagogy*. Nanchang: Jiangxi University Press.
- Dong, C. (2001). Suggestion on developing the synthetical curriculum in some secondary vocational schools promulgate by the General Office of the Ministry of Education. *Chinese Technical and Vocational Education* (10).
- Du, J. (2005). *Study on technical and vocational education under socialism market-driven economy*. Beijing: Economic Science Press.
- Du, Y., Yao, Y., & Li, X. (2007). *Discussion on adult education development*. Beijing: China Remin University Press.
- Feng, H. (2001). Research of higher professional schools' setting and management problems. *Education & Profession* (12).
- Guo, Y., & Chen, J. (2007). Preliminary analysis on the level of technical and vocational education teaching faculty construction. *Vocational Education Forum* (12).
- Gu, L., & Wu, X. (1999). *Macro manual*. Zhengzhou: Henan People's Press.
- Hao, K. (2000). Several questions on rigorously developing vocational education. *Educational Research* (9).
- Hao, X., & Ren, C. (1999). Analysis on the reform and development of Chinese vocational education. *Journal of Northeast Normal University* (2).
- Huang, X. (2005). Credit system—The actual need of VTE reform. *Chinese Technical and Vocational Education* (25).
- Jiang, L. (2001). The present situation & trend of middle vocational school's specialty setting. *Education Science Research* (6).
- Jiang, N. (2001). Credit system, flexible course and course management. *Vocational Education* (19).
- Li, C. (2007). Practice and thinking on how behavior-oriented teaching mode optimize classroom teaching. *Health Vocational Education* (14).
- Li, H. (2008). Practical exploration on teaching modes of combination of working and studying in technical and vocational junior colleges. *Vocational Technology* (2).
- Li, H. (2006). *Study on the curriculum reform of higher vocational education*. Master's Thesis of Northeast Normal University.

- Li, Y., & Cui, Y. (2004). Analysis on the professional development of vocational education teachers. *Chinese Vocational and Technical Education* (20).
- Liu, C., & Xu, C. (2002). *Vocational pedagogy*. Beijing: Education Science Publishing House.
- Liu, H. (2004). *Vocational pedagogy*. Guangzhou: Guangdong Higher Education Press.
- Liu, H. (2004). *Study on technical and vocational education*. Guangzhou: Guangdong Education Publishing House.
- Liu, J. (2007). Preliminary study on formulating two-year schooling system of higher education of the textile technology profession. *Guangxi Light Industry* (11).
- Liu, L. (2004). *The research of present situation & solution of specialty setting in middle vocational schools in Xuzhou*. Master's Paper from Tianjin University.
- Ma, Z. (1999). The basic constitution of macao technical and vocational education. *Education Review* (5).
- Micheal, E. (1999). *Kinds of professional knowledge: Modes of knowledge use and knowledge creation*. Washington, D.C.: Falmer Press.
- He, O., Huang, L., & Wang, J. (2003). *Research and Reflections on Higher Professional Education Development in Hunan*. <http://www.edu.cn>.
- Qin, X. (2013). Research on comprehensive teaching design for engineering courses in higher vocational colleges based on the integration of work and leaning. *Modern Vocational Education* (6).
- Risler, M., & Zhao, Z. (2014). Apprenticeship and small and medium-sized enterprises—The China case. Regional Association for Vocational Teacher Education in Asia, Chiangmai. <http://ravte.asia/study-8-now-online-apprenticeship-and-small-and-medium-sized-enterprises-the-china-case/>. Accessed 5 April, 2015.
- Shao, A., Liu, Y. (2008). Thinking about Connotation of the Vocational Education Teachers' Specialization. *Adult Education* (2).
- Sun, Z. (2005). *Study on the relation of credit system and the curriculum reform of secondary vocational education*. <http://www.hvae.com.cn/jiaoxuegaige/ShowArticle.asp?ArticleID=258>.
- Wang, M. (2004). The development of higher vocational education. Beijing: Education Science Press.
- Wu, X. (2001). Technical and vocational education in Taiwan. *Technical and Vocational Education* (13).
- Wu, X. (2007). *Basis and application-study on the policy of higher vocational education*. Hangzhou: Zhejiang Education Press.
- Wu, X. (2007). *Fundamental and applicable—Study on higher vocational education policy*. Hangzhou: Zhejiang Education Press.
- Xie, Y. (2004). *Research of higher professional schools' specialties setting*. Doctor's Paper from Tianjin University.
- Yang Bo (2005). Study on the inner operating management mechanism of higher vocation. *Education Exploration* (5).
- Yu Z., et al. (2016). Transferring from a great nation to a powerful nation of technical and vocational education. *Technical and Vocational Education* (6).
- Yu, Z. (2009). School-enterprise cooperation mechanism in VET. *Chinese Vocational and Technical Education* (4).
- Zhou, Y. (2007). On the construction of teaching troop in secondary vocational education. *Education and Vocation* (12).
- Zhao, Z. (2001). Teaching organization and methods of higher technical and vocational education. *China Higher Education Research* (4).
- Zou, T., Liu, C., Ji, Z. (1992). *Vocational and technical pedagogy*. Beijing: Education Science Publishing House.

Documents

- General Office of the Ministry of Education of the People's Republic of China. *Notice on establishing diagnosis and improvement institution in vocational schools of the general office of the ministry of education* [EB/OL]. http://www.moe.edu.cn/srcsite/A07/moe_737/s3876/201507/t20150707_192813.html, 2015-06-23:1.
- General Office of the Ministry of Education of the People's Republic of China. *Teaching standard of secondary vocational school* [EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_721/201405/169178.html, 2014-04-30.
- Government of the People's Republic of China. *Simple reading of 2016 report on the work of the government* [EB/OL]. http://www.gov.cn/xinwen/2016-03/05/content_5049333.htm, 2016-03.
- Jiangsu Provincial Education Examination Authority. *Notice on implementing separate entrance reform of higher vocational schools in 2015 of department of education of Jiangsu Province* [EB/OL]. http://www.jseea.cn/contents/channel_26/2014/12/1412311159766.html, 2014-12-31.
- Ministry of Education of the People's Republic of China. *Action Plan on Improving Management of Vocational School (2015-2018)* [EB/OL]. http://www.moe.edu.cn/jyb_xwfb/s271/201509/t20150917_208782.html, 2015-09-17.
- Ministry of Education of the People's Republic of China. *Construction achievement of training base supported by the central finance* [EB/OL]. http://www.moe.gov.cn/s78/A07/zcs_left/zywlm_zhgg/s3060/s3062/201412/t20141222_182161.html, 2014-12-22.
- Ministry of Education of the People's Republic of China. *Innovation and development action plan of higher vocational education* [EB/OL]. http://www.moe.gov.cn/srcsite/A07/moe_737/s3877/201511/t20151102_216985.html, 2015-10-12.
- Ministry of Education of the People's Republic of China. *Notice on confirming construction program of 2014 teaching resource library of vocational education of ministry of education.*
- Ministry of Education of the People's Republic of China. *Notice on confirming construction program and bonus program of 2015 teaching resource library of vocational education of ministry of education* [EB/OL]. http://www.moe.gov.cn/srcsite/A07/moe_737/s3877/201507/t20150727_195705.html, 2015-06-30.
- Ministry of Education of the People's Republic of China. *Mid-stage assessment of national education plan (2010–2020)—Appraisal report of vocational education* [EB/OL]. http://moe.edu.cn/jyb_xwfb/xw_fbh/moe_2069/xwfbh_2015n/xwfb_151202/151202_sfc/201512/t20151202_222297.html, 2015-12-02:3.
- Ministry of Education of the People's Republic of China. *National medium and long-term educational reform and development program (2010–2020)* [EB/OL]. http://www.moe.gov.cn/jyb_xwfb/s6052/moe_838/201008/t20100802_93704.html, 2010-07-29:21.
- Ministry of Education of the People's Republic of China. *Notice on implementing annual quality report system of secondary vocational schools of office of the ministry of education* [EB/OL]. http://www.moe.edu.cn/srcsite/A07/s7055/201601/t20160126_228908.html, 2016-01-12:3-4.
- Ministry of Education of the People's Republic of China. *Opinions on carrying out apprenticeship pilot of ministry of education* [EB/OL]. <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s7055/201409/174583.html>, 2014-08-25:4.
- Ministry of Education of the People's Republic of China. *Opinions on Deepening Vocational Education and Teaching Reform and Improving the Quality of Talent Cultivation of Ministry of Education* [EB/OL]. http://www.moe.gov.cn/srcsite/A07/moe_953/moe_958/201508/t20150817_200583.html, 2015-07-25: 3-4.
- Ministry of Finance of the People's Republic of China. *Opinions on establishing and completing the average appropriation system directed by reform and performance and accelerating development of higher vocational education* [EB/OL]. http://jkw.mof.gov.cn/zhengwuxinxi/zhengcefabu/201411/t20141128_1161021.html, 2014-10-30:3.

- Ministry of Education of the People's Republic of China. *Opinions on improving higher education quality of ministry of education* [EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s6342/201301/xxgk_146673.html, 2012-03-16:5.
- Ministry of Education of the People's Republic of China. *Revision note of category of higher vocational education specialty of general higher school 2015* [EB/OL]. http://www.moe.edu.cn/srcsite/A07/moe_953/moe_722/201511/t20151105_217877.html, 2015-10-28:1.
- Ministry of Education of the People's Republic of China. *2012 China education overview* [EB/OL]. <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s5990/201111/126550.html>, 2013-10-23:7.
- Ministry of Education of the People's Republic of China. *2013 China education overview* [EB/OL]. http://www.moe.gov.cn/jyb_sjzl/s5990/201503/t20150331_186797.html, 2015-03-31:5-7.
- Ministry of Education of the People's Republic of China. *2014 China education overview* [EB/OL]. http://www.moe.gov.cn/jyb_sjzl/s5990/201511/t20151125_220958.html, 2015-11-25:7.
- Ministry of Education of the People's Republic of China. *Opinions on promoting the recruitment system reform of higher vocational education* [EB/OL]. <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s3258/201306/152732.html>, 2013-04:1.
- Ningbo Haitian Group Corporation. *The 2016 annual quality report of Ningbo Haitian Group Corporation* [EB/OL]. http://www.tech.net.cn/web/rcpy/articleview_sch.aspx?id=4856, 2016-01.
- Shanghai Municipal People's Government. *Implementation plan on promoting the enrollment system reform of higher school* [EB/OL]. <http://www.shmec.gov.cn/html/xxgk/201409/420032014012.php>, 2014-09-18:3.
- State Council of the People's Republic of China. *Opinions on increasing education input of the state council* [EB/OL]. http://www.gov.cn/zwqk/2011-07/01/content_1897763.htm, 2011-07-01:2-4.
- The State Council of the People's Republic of China. *Decisions on accelerating vocational education of the state council* [EB/OL]. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_1778/201406/170691.html, 2014-05-02:6.
- UNESCO. *Rethinking education: Towards a global common good* [EB/OL]. <http://unesdoc.unesco.org/images/0023/002325/232555e.pdf>, 2016-03:10.
- Vocational & Adult Education Department of the Ministry of Education of the People's Republic of China. *Notice on submitting annual quality report of higher vocational schools (2014)* [EB/OL]. http://www.moe.gov.cn/s78/A07/A07_gggs/A07_sjhj/201311/t20131113_159343.html, 2013-11-11:3.
- Vocational & Adult Education Department of the Ministry of Education of the People's Republic of China. *Acceptance result of 2010 teaching resource library programs of higher vocational education* [EB/OL]. http://www.moe.gov.cn/s78/A07/A07_gggs/A07_sjhj/201310/t20131011_158260.html, 2013-10-09.
- Vocational & Adult Education Department of the Ministry of Education of the People's Republic of China. *Acceptance result of 2011 teaching resource library programs of higher vocational education* [EB/OL]. http://www.moe.gov.cn/s78/A07/A07_gggs/A07_sjhj/201301/t20130131_147396.html, 2013-01-30.
- Vocational & Adult Education Department of the Ministry of Education of the People's Republic of China. *Instruction on diagnosis and improvement of inner quality assurance system in higher vocational schools* [EB/OL]. http://www.moe.edu.cn/s78/A07/A07_gggs/A07_sjhj/201512/t20151230_226483.html, 2015-12-30:3-15.