

PROCEEDINGS ARTICLE

Origin, Evolution and Development of the Work Process System Curriculum in China: In View of Dewey's Educational Psychology

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ABSTRACT

In the cause of educational reform, especially the issuance of the "Guidance Program for Training Skilled Talents in Shortage in Vocational Colleges" in 2004, China's higher education encounters two embarrassments: (1) The shift of focus from knowledge imparting to "work process" skill training in general undergraduate education is easy to cause simply vocational education and fall into the state of "neither being vocational nor general"; (2) Training talents for enterprises is either over-educated or mismatch the post of enterprises. The work process system can serve a dose of medicine: originated theoretically from Dewey's Educational Psychology, and practically from the mode of vocational education curriculum in Germany. This study reviews the system from longitudinal logic analysis in terms of the origin, evolution and development in China. The article starts from the perspectives of education development, analyzes in depth the ideological evolution of the work process system, and the difficulties in acclimation in China, and ideas on the settlements of those difficulties. Some inductive and deductive methods are used in reasoning. Some horizontal comparisons are also adopted when analyzing the different regimes and governance modes between China and Germany. The results show that the work process system has roughly experienced three stages in China: introduction, absorption and trial, and improvement and innovation. However, vocational education in China presents the new characteristics of the application transformation of local undergraduate colleges and universities, and the competition-like design of work tasks all determine that it is difficult for the theory to integrate and adapt to the short run in China. In addition to improving scientific structural design, China should combine the application-oriented transformation and development of local undergraduate colleges with the reform of secondary vocational education, and then improve and enrich the structure of the three-dimensional development model and assessment system. The "craftsman training" philosophy oriented by the working process serves the reform of China's higher education and the high-quality development of China's economy.

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1. INTRODUCTION AND PROBLEM PROPOSAL

In 2004, the Ministry of Education and the former Ministry of Labor and Social Security jointly issued the "Guidance Program for Training Skilled Talents in Shortage in Vocational Colleges", which requires that the curriculum of schools should be developed in accordance with the actual work tasks of enterprises.

Since then, the curriculum model of work process system has rolled out a new wave of curriculum development and reform. Since July 2010, the "Outline of the National Medium and Long-term Education Reform and Development Plan (2010–2020)" pointed out that China's education had not fully adapted to the national economic development and the requirements of the people to receive good education. It proposed to advocate participatory teaching and to help students

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learn how to learn. Thereafter, a series of documents have been issued successively, such as the "Circular on the Arrangement of the Pilot Work of Transforming and Developing Local Undergraduate Colleges and Universities Convened by the Ministry of Education", the "Circular of the State Council on the Issuance of the Implementation Plan for the Reform of National Vocational Education", and the "Guidelines for Some Local and Ordinary Undergraduate Colleges and Universities to Transform Into Application-Oriented Universities", which sets that vocational education should be placed in a more prominent position in educational reform and innovation and economic and social development.

By 2022, a large number of ordinary undergraduate colleges and universities will be transformed into application-oriented ones, and 50 high-level higher vocational schools and 150 key majors (groups) will be built. In the process of transformation, local undergraduate colleges and universities that "survive in the cracks" have taken the initiative action to dock and join the transformation. However, in the process of reform, the following embarrassments have been encountered: on the one hand, the shift of the focus from knowledge imparting to "work process" skill training in general undergraduate education is easy to cause simple vocational education and fall into the state of "neither being vocational nor general"; on the other hand, training talents for enterprises is either over-educated or not match for their posts. Based on the theoretical implication of working process system, it provides the reform ideas from policy design to the curriculum categories and then to the classroom reform for the local undergraduate colleges in transition, which is of great significance in the application-oriented transformation and action program of the current local undergraduate colleges.

Although China has actively explored and introduced foreign advanced teaching theories and practices, there is no effective model and method for the cultivation of comprehensive vocational ability. Applied and vocational education should be rooted in the cultivation of craftsmen, which is a national plan and can't stay at "livelihood education" stage. The work process-oriented education model provides a reference for application-oriented undergraduate schools to move towards a high-level and sustainable road, and from livelihood education towards maker's education and to help them get out of the dilemma of knowledge imparting and skill training. Work process system originates from the joint meeting of German ministers of culture with the "learning by making" at its educational psychology theory which requires vocational teaching plans to organize teaching according to the production requirements of enterprises. The "knowledge, skills and key abilities"

contained in the educational objectives direct the way for the combination of "application-oriented" and "high-level" education in local colleges and universities in China. Through the comparative study of the latest achievements of German vocational education, Chinese scholars put forward the concept of "action system" unique to vocational education and constructed a system framework oriented by working process. It is mainly about technical engineering [1]. After studying the specific teaching attributes, positioning and prospects of vocational education, Chinese scholars think that structural refinement [2,3] should be implemented in vocational education under the framework of vocational science.

From 2002 to 2012, work process system has been a hot topic, and its research has been paid more and more attention. The different intensity of work-oriented vocational education curriculum research before and after 2007 reflects the research changes in the general environment of vocational education curriculum theory, and it is also promoting such changes. At the same time, the theoretical schools and the theoretical research of vocational education experts have also undergone a turning point [4]. Work process system replaces result system, first focusing on task driving, then focusing on process accumulation, and finally returning to knowledge summary and theory verification [5]. The structural logic based on the work process system includes: the applied appeal, the human nature implication and the operational direction [6]. From theoretical interpretation, practical analysis to local transformation and innovation, the curriculum structure based on work process system has also experienced two modes of teaching [7]: "combination of work and study" and "project curriculum". The application-oriented requirement of local undergraduate colleges is essentially to integrate the work process into the traditional knowledge acquisition. As researchers have different opinions on the attributes of application-oriented undergraduate education in China, application-oriented undergraduate schools develop slowly in the process of attribute disputes and curriculum adjustment. The characteristics are not obvious. Therefore, the research on curriculum reform of application-oriented undergraduate courses in China should take the analysis of working process and the exploration of talents' professional ability as the premise and starting point, in order to form the basic framework of curriculum objectives, curriculum content and curriculum structure with Chinese local features [8].

In China, the application of the curriculum structure of work process systematization has been expanded to many fields, but there are still several aspects to be explored in depth: First, the curriculum model of

working process system is based on the concept of “process system”, emphasizing the design and importance of process, while this theory based on vocational education is enterprise-oriented rather than school-based. This makes its development in China, which is based on schools, less “acclimatized”.

Secondly, due to limitations of practice in China, and with the acceleration of the reform process of Chinese universities and the transition of local undergraduate colleges to application-oriented transformation, this kind of application-oriented theory is just in time, combining with China’s national conditions, it can provide solutions to the painful points and difficulties in the process of application-oriented reform. However, from the current research progress, the connotation development of curriculum reform needs to be deepened and widened, and the theory heightened with Chinese characteristics.

Thirdly, the working process-oriented teaching mode pays attention to students’ self-directed learning, and guiding role of teachers requires higher knowledge framework and working skills accumulation in advance, which is a difficult and systematic project. Government concerned needs to break through the governance model from the policy design.

Based on the above-mentioned points, this study aims to start from the origin and development of working process systematization abroad, especially in Germany, and from a diachronic and synchronic comparative perspective, to explore the development process of the theory in China and the above inadaptability in the process of application and innovation. This article analyzes practical problems encountered by the theory in China and the feasible countermeasures to solve these problems. It also puts forward some action suggestions for the combination of the working process-oriented concept during and after the application-oriented transformation of local undergraduate colleges in future.

2. ORIGIN AND EVOLUTION IN GERMANY

The originator of the work process, Rauner, thinks that the work process is “a complete work procedure to accomplish a task and obtain work achievement in an enterprise”, and it is “a comprehensive system that is always in motion but has a relatively fixed structure”. The core elements of work process are “workers, work objects, work tools, work methods and work products”, which interact in the whole work process under a specific working environment to achieve the pre-established work objectives.

2.1. The Origination and Development of the Work Process System in Germany

The work process system was put forward by Germany to solve the inoperability of the synchronization scheme, coordination scheme and differential curriculum scheme of the labor process system. Originating from the trend of thought of “labor process-oriented” vocational education, the Handbook of Vocational Education Research edited by Rauner is the first comprehensive research report on technical and vocational education and training. It is also the first publication of research methods in the world. It has become an educational trend of thought leading the direction of vocational education reform in Germany and even in Europe. The research of Rauner team has made great fundamental contributions to international vocational education research. The work of summarization, analysis and criticism of Franz Petermann, Eckart Severing and Ladina Rageth implies that: Rauner has made striking progress in the research of labor process-oriented vocational education thought, general-vocational relationship, dual system and response scheme for youth unemployment, vocational education governance model and vocational ability development and evaluation (COMET) project. Gessler Michael agrees that Rauner has great theoretical contribution to “strengthening the cooperation between the workplace and the school” [9]. Since the 1980s, the working process-oriented vocational education has experienced the process of germination, formation and development in Germany, and has become an important educational trend of thought leading the reform of vocational education in Germany and even in Europe. A solid foundation of the industrial system 4.0 has really come down to the educational system.

2.2. The Success of the Work Process System in Germany

In Germany, which is famous for its “craftsman spirit”, the work process system has made an undeniable contribution. This model can endure for a long time because of its comprehensive governance model. Germany has a federal regime and each state has its own cultural autonomy. In addition to the federal government, state governments, trade associations, and business federations are among the authorized departments. The main body of curriculum development includes the Federal Government, the Vocational Education Commission, the Federal Vocational Education Institute, the Joint Conference Management Committee of the Ministers of Culture and Education of the States, etc. Relevant functional departments of the government coordinate and guide

through the establishment of special advisory committees. In terms of quality, the ad hoc "Education Quality Evaluation Committee" regularly evaluates the quality of teaching in order to formulate a teaching quality evaluation system. The perfect legal system has formed a guarantee network for all aspects of vocational education. The Federal Vocational Education Act, the Federal Vocational Education Promotion Act and the Federal Vocational Education Guarantee Act clearly stipulate that to guarantee the status of vocational education, all enterprises must provide training, or they will pay taxes for penalty. Enterprises must comply with the specific provisions of the Regulations on Vocational Education. Other laws, such as the Handicraft Regulations, the Labor Promotion Law, the Enterprise Law and the Youth Labor Protection Law, are linked up with a series of laws, rules and regulations based on the Federal Basic Law on Education to ensure the healthy development of German vocational education [10].

The combination of macro-governance and micro-governance, which promotes market governance by professional qualifications, ensures that training content and teaching process review are implemented in a pluralistic network. "School-enterprise cooperation" is the basic platform for curriculum implementation, and enterprises have been actively partaking because they benefit from the participation in vocational education. In turn, the school also receives continuous resource and technical support. Enterprises, students, schools and even the whole country enjoy multi-win situation.

2.3. Some Disputes About the Work Process System

Felix Wenzelmann pointed out that the knowledge of labor process should not only be taught in non-productive time, but also be "learned in the process of work through skilled work activities". The Doubts about the theory of "dual system" vocational education focus on the difficulty of its implementation. For example, Eckart believes that under the relationship between supply and demand, young people may be deprived of training qualifications because they do not have social skills. Rauner's complex profession amounts to the exclusion of disadvantaged youth. However, there is a lack of theoretical basis for the abstraction and cognition of the working process [9]. Many German vocational education experts, including Professor Lipmeier, have pointed out the incompleteness of work process system: For example, teaching that emphasizes vocational activities may lead to a tendency to attach importance only to so-called "primary" experience, feelings and actions while

ignoring basic concepts, rationality and experiments. It excessively propagandizes the self-learning culture of the whole network of the completely open and unique "learner center". It may lead to the major drawbacks of learning content, such as chaos, contingency, ambiguity, locality, confusion and anti-interaction. Nevertheless, Professor Lipmeier also pointed out that the emphasis on these shortcomings does not indicate the "revival" of disciplinarily, rationalism and professionalism in vocational education. In contrast, the reform of vocational education curriculum implemented by the state from three aspects of "learning field", "working process" and "cooperative education" should be supported.

3. EVOLUTION IN CHINA

The work process system in China follows the introduction process of "work process orientation curriculum", "work study combination curriculum" and "project curriculum". In terms of content, it has also experienced curriculum system (theoretical course + practical training course) and classroom reform (activity design of each teaching link). The curriculum of work process system has witnessed its heyday since the new century known because of correcting the drawbacks of "emphasizing theory and neglecting practice". It gains gradually adaptability and vitality in China.

3.1. Theoretical Learning Stage: The Work Process System

The work process-oriented program was first introduced into China in 2003, and then attracted the attention of the domestic vocational education community. In the past two decades, domestic vocational education scholars have devoted themselves to localization of the work process system, which has a far-reaching impact on the theoretical research of the vocational education curriculum in China. Based on Jiang Dayuan's "Learning Field" Course: Concepts, Characteristics and Problems: Reflections on the Major Curriculum Reform in German Vocational Schools. Until 2008, academic research on working process-oriented teaching methods has been growing vigorously, such as Xu Han's "Basic Characteristics of German Work Process-Oriented Programs" published in the first issue of Educational Development Research in 2008. And scholars published "Understanding of Work Process System" [11] in the Vocational Education Forum. The main research topics are "Research on the Mainstream Educational Thoughts of Contemporary German Vocational Education", a key project of the Ministry of Education of the National Educational

Science Planning “Tenth Five-Year Plan” presided over by Professor Jiang Dayuan. The research on work process system is included in the book *Research on Mainstream Educational Thoughts of Contemporary German Vocational Education: Theory, Practice and Innovation* [3].

Among the theoretical interpretation of vocational education experts oriented by working process Jiang Dayuan’s philosophical thought is the most representative. His related theoretical research is also the most systematic, and these achievements are mainly embodied in the theory of systematic curriculum development of working process. First, Jiang’s interpretation of important concepts such as action domain, learning domain and learning situation and their interrelationships has almost become the basis of relevant research in China. Secondly, it explains the working process-oriented development process, involving the standards, steps, ideas and methods of curriculum design and development, which provides an important reference for domestic vocational education curriculum theory. There is an obvious theoretical origin between the work process-oriented curriculum and the project curriculum. In the curriculum theory of work process systematization, Jiang put forward the “six elements” of vocational education curriculum content and the “six stages” of vocational education curriculum structure, which has already set a standard norm of all kinds of vocational education lecture and teaching design evaluation. In the process of the curriculum development, Professor Jiang summarized 15 kinds of learning situation design carriers according to different occupational characteristics, such as processing and manufacturing components, parts, equipment, commercial projects, business categories, responsibilities, tasks, breeding and planting varieties, facilities, etc. These specific carriers point out the direction for teachers to design learning situations [3].

3.2. Absorption and Application Stage: Combination of Work and Study

Because of the “action-oriented” characteristics, this teaching paradigm is widely used in various disciplines: social sciences, languages, natural sciences. In order to overcome its school curriculum in essence, domestic vocational education scholars put forward the overall curriculum plan of school-enterprise combination in this stage: unified vocational school and educational enterprise workplace “Dual” learning sites [11]. Since then, Jiang’s “theoretical interpretation version” of the localization of the work process-oriented curriculum in China and Zhao Zhiqun’s “practical analysis version” of the combination of work and study have

been formed. The essence of the integrated curriculum of work-integrated learning is the practical analysis of the implementation process of learning field courses in China’s vocational colleges. Starting from the essence of vocational education curriculum and the concept of comprehensive vocational ability and its formation mechanism, Zhao demonstrated the advancement of work process system. According to the practical needs of curriculum development, the combination course of work-integrated learning in vocational education introduces in detail the “typical work task analysis”, which is an integrated work analysis method based on work process. The structure and order of the curriculum system should follow the theory of the growth stage of professional ability from beginners to experts put forward by F. Rauner. The knowledge type, problem content, task characteristics and action characteristics of each stage are sorted accordingly. The integrated curriculum of work-integrated learning clarifies the concepts that are easily confused in practice, such as learning tasks and job tasks, work process and production process, work process system and project curriculum, etc. In particular, scholars have discussed the construction of multi-functional, comprehensive and integrated teaching places, which is the biggest “weakness” in the current curriculum reform of vocational education in China besides the quality of curriculum development [7,12].

3.3. Improvement and Innovation Stage: Formation of Project Curriculum Model

The project curriculum model developed by Xu Guoqing is a “local improved version” of the work process system. In the project curriculum, a lot of signs of work process-oriented can be traced, and there is a clear relationship of inheritance and then development. Theoretically, on the basis of the analysis and deconstruction of the subject curriculum by the working process system, Xu Guoqing focused on the analysis and deconstruction of the ideological roots of the school-based vocational education system in China, which is helpful to understand the current situation of vocational education in China. In terms of curriculum development methods, the state draws lessons from the BAG curriculum development method oriented by work process (i.e. “typical occupational task analysis method”). He uses the form of “practical expert seminar” to carry out occupational analysis which greatly simplifies technical difficulty of work process-oriented development and makes it easier for teachers in vocational colleges to grasp the core content. In practice, Xu believes that the formation mechanism of vocational ability is to establish a link between knowledge and work tasks, to

organize curriculum content with work tasks as the center, and then construct this link through situational vocational practice activities (“projects”). This view of occupational competence formation makes the abstract concept of the competence integrate into the dynamic work process composed of knowledge and tasks, which is a major innovation of the concept of occupational competence. In addition, based on the new paradigm of “working process-oriented”, Xu Guoqing developed the structural branch and comprehensive branch of the project curriculum. The former emphasizes that the curriculum structure should be designed according to the work structure and the latter that to master the complete work process is very important for the cultivation of occupational ability”. From work process system to project curriculum, through the efforts of scholars, work process system has gradually moved from theoretical research to college practice, and related theories and technologies have become the basic principle of vocational education curriculum reform in China. Only based on that has the local project curriculum model [13] been formed.

From 2007 to 2012, theoretical research of the system is the most vigorous compared with other theoretical research, and it has always been an important means to enrich the research of the vocational education curriculum through the theoretical schools and the theoretical research by vocational educators, followed by the discipline and discourse system of vocational education. The least studied are technology and employment-oriented curriculum research. During this period, many colleges and universities in China have established excellent cases based on their own characteristics, drawing lessons from or following the work process-oriented theory originated in Germany. For example, Yangling Vocational and Technical College has developed a learning program [10] for earthwork construction after fully drawing lessons from the theoretical guidance.

The work process system has gradually been introduced into secondary vocational education since 2012 for the development of curriculum, the standards design of evaluation system and the development of various professional teaching materials such as textbooks of secondary vocational curriculum. Some scholars even believe that the work process-oriented internal stage model can be integrated with modern education and teaching methods, such as flipped classroom and other curriculum development and application platforms. Up to now, the three-dimensional research of work process system has begun to take shape. Even though after that, scholars introduced the TAFE model of Australia, the CBE model of the United States and the BTEC model of the United Kingdom, the development

of these models has also played partly iconic role in China, and the system of German work process has survived because of its unique career-oriented advantages. However, its development in China still sees a long way to go and an arduous task to fulfill.

4. INADAPTABILITIES IN CHINA

4.1. School-Based Governance Makes It Difficult to Acclimate the System of Work Process

High-quality enterprise on-the-job training is essential for the acquirement of skills, and to ensure a stable supply for high-quality training positions, an enterprise vocational education system should be established. In China, vocational schools are the main venue of education. Typical vocational and technical education will sign an internship agreement with the enterprise in the third year, which is the starting point for students to either continue the contract or to find their own jobs after accumulating experience and make a natural transition to be employed. However, in Germany enterprises are the main place of vocational education, and shoulder fundamental responsibility in vocational education leading various arrangements of vocational education while schools are just supplementary. In other words, work process system is only a “supplementary” course of German vocational education. The leading role should be the enterprise curriculum. China is a typical school-centered education system, no matter how advanced the teaching content of the school is, compared with the latest knowledge, technology and craftsmanship applied in the production and served front line, there is always a distance [14]. This is the inherent contradiction of the curriculum reform of vocational education in China. There are no regulations and incentives for local enterprises to participate in school development projects.

4.2. Compiling Practical Teaching Materials Makes Work Tasks Just Competitions

No matter how experts demonstrate the feasibility of curriculum development by schoolteachers in theory, most of them still stay “behind closed doors” to textbooks in practice. The implementation of work process system requires higher framework conditions and is very difficult. In the process of reform, due to the lack of enterprise cooperation, practical teaching materials have become the biggest difficulty. The distortion is almost inevitable that if the work process-oriented practice is limited by the principal’s personal understanding and curriculum leadership,

the teacher's participation motivation and ability, the school's resource conditions and curriculum management competence, and the school's teaching organization's willingness and ability to reform. If the typical task analysis or post task analysis link is artificially simplified or even deleted, the content of the course does not come from the work system and the work structure, but is a patchwork of various materials and experiences. Many textbooks with the name "combination of theory and practice" eventually return to the traditional classroom [7] because there is no corresponding occupational classroom for combination of theory and practice. These tasks may be designed into modules to participate in the corresponding competition projects for the sake of employment. As a result, the study of disciplines focuses on competitions. Trade associations at all levels hold competitions, and students are busy preparing for various competitions, competing for competitions in classroom. Because of this mode of teaching materials being put before curriculum structure, the school attaches great importance to teaching materials. Teachers are tired of writing textbooks instead of sorting out feasible textbooks after analyzing the needs of enterprises in the process of working. Typical work tasks are not typical, and too many or too few courses can't reflect the typical work process. The learning situation has no situation and the curriculum content has no theory [15]. In the long run, it will go further and further away from the connotation construction and development.

4.3. Single Vocational Education System Is Difficult to Adapt to China's Dynamic Reform

With the popularization of higher education, it is increasingly showing the vitality of development and application-oriented undergraduate education comes into being in China. The base of talent cultivation after the transformation of high-level application-oriented policy lies in practice, which should cultivate talents with lower theoretical level than academic talents, higher operational ability than skilled talents. It is different from the applied higher vocational education curriculum. In addition to vocational adaptability, application-oriented undergraduate courses must also have the characteristics of occupational extension and theoretical deepening. Therefore, simply to regard each chapter of the book as a sub-project goes far away from the teaching objectives of application-oriented undergraduate course. At present, there are some problems in constructing application-oriented undergraduate courses in China, such as weak system of the overall project and loose organization of sub-projects, the mono-form of practical courses. The

training is difficult to "face the working process" and the refinement of the curriculum system is insufficient. It is difficult to jump out of the traditional undergraduate education mode. If China just underlines vocational education, highly overlapping, featureless, or simply "vocationalization" will be found out among local undergraduate education, vocational and technical education. The curriculum structure of the work process that fails to keep pace with the times will be difficult to keep pace with China's education reform. Especially after the application reform, the relevant study is less and less, and the research object is single in vocational education. For example, the mechanism and mode of working process structure in class is relatively simple, such as emphasizing professional ability, methodological ability and social ability, but the study keeps superficial or even rarely seen in the study [16]. Or a course structure [17,18] is proposed for a certain major, however, not implemented step by step according to the law of work task process [19]. Therefore, in the teaching reform and development of application-oriented undergraduate courses, the design of the overall project should be further emphasized, and the implementation of the sub-projects should be carried out in stages.

4.4. Labor Division Complicates Work Process

The horizontal and vertical extension or segmentation of the division of labor blurs the boundaries of occupations and escalates the complexity of work processes. The prerequisite for increasing the added value of work tasks is to expand the knowledge boundary of skilled workers, otherwise it is difficult to meet the skill requirements post requires. It can effectively collect information in the face of complex work situations. It integrates theoretical knowledge, practical knowledge and experience of using methods in this field and related industries. The learning model of "learning-internalization-creative application" has not yet been formed [20].

5. VIEWS ON OVERCOMING THESE INADAPTABILITIES

Since its introduction into China, the theory of working process system has accelerated the historical process of exploring the local curriculum model of vocational education in China, and has formed rich research results of curriculum theory, which has a significant impact on the theoretical circles of vocational education. However, as a school curriculum, it has inherent limitations in the

cultivation of vocational ability, and the uneven development in quality of curriculum. Curriculum implementation often faces the embarrassing situation of “classroom come-back”. The executive meeting of the State Council proposed to “establish a dual technical personnel cultivation mechanism for schools and enterprises”, which can be said to be the theme of China’s vocational education reform. For Chinese vocational education researchers and practitioners, there is still a long way to go. But some ways-out from experts and scholars can help.

5.1. Breakthrough in Governance Model

Compared with Germany, the Chinese government invests less in vocational education. The national macro-control and security level is not systematic enough, and the network security system like Germany has not been formed. Because occupational regulation is part of the “mixed” cooperative governance system, vocational education regulation under the occupational driven governance model is carried out in the multi network of state organs, enterprises or employers’ associations, trade unions or professional associations. Although the Vocational Education Law, which is the basis of China’s vocational education, has been constantly revised, it is aimed at the participation of enterprises in vocational education. There is no restriction on whether schools conduct training for society [21]. Others, such as the Labor Law, the Higher Education Law, the Teachers Law and the Social Education Promotion Law, have no direct provisions on the performance of schools and enterprises. Other administrative rules and laws, regulations, measures and local regulations mostly appear in the form of planning outlines, notices, or even if there are provisions, there are few mandatory and specific performance clauses. Therefore, China lacks the enthusiasm of enterprises and the initiative of higher vocational colleges because of insufficient incentives. That is to say, China lacks what Rauner points out, a cooperative vocational education system such as the dual system involving at least two modes in the implementation process. It needs to be carried out through the cooperation of state agencies, enterprises, employers’ associations, trade unions or professional organizations, it is the mixed or pluralistic governance model [9].

5.2. Structural Design Improvement

In the face of institutional obstacles, the three courses of work process-oriented localization in China have to seek solutions to the “work-study combination” problem within the current institutional framework of school vocational education. Scholars try to realize the combination of work and study by building multi-

functional and comprehensive special classrooms in schools. They repeatedly emphasize the fundamental role of workplace learning in the formation of professional competence. In the vocational education of work-integrated learning, job training plays an irreplaceable role compared with the “artificial environment” of vocational colleges, the “natural environment” of job training can effectively promote the development of students’ key abilities [12]. Xu Guoqing also emphasizes in the project course that “a large number of real projects from enterprises must be developed”. In order to meet the needs of modern society for high-quality skilled talents, vocational colleges need to actively change their thinking and reform, vigorously carry out the teaching mode oriented by the work process and aimed at cultivating the core competence of the vocation, and advocate various teaching strategies and methods. It enables students to combine their hands, hearts and brains, and to develop in a balanced way in terms of professional skills, business abilities and social abilities. At the same time, it should be noted that there are still many debates in the educational practice of the process-oriented teaching mode, which mainly focus on the following four aspects. First, compared with the traditional teacher-centered and school-based vocational education mode, the traditional teacher-centered and school-based vocational education mode focuses on the following aspects: The action-oriented teaching method used in the process-oriented mode is based on the simulation teaching situation, which has many interference and uncontrollable factors. In particular, the emphasis on the accumulation of practical experience has led many people to believe that it will weaken the educational function and the organizational nature of learning that schools can exercise in the traditional sense as places of strict organization of teaching [15]. The key and breakthrough of the connotation construction of higher vocational colleges is “research”. From “construction” to “research”, it is the transformation of the connotation development paradigm of higher vocational education, which can be called “research-oriented higher vocational colleges”. The development idea based on research requires expanding the construction cycle of the project, building the hardware platform, and systematically planning important research fields, and constructing the awareness to building a culture and institutions that promote research. Taking the road of high-level and quality development, considering the advantages and disadvantages of the two learning places, the state may combine work-based and school-based learning to design the teaching structure. School-run-factory learning, as a curriculum model between classroom learning and work-based learning, may have a realistic value for China [22,23].

5.3. Applying the Work Process System to the Curriculum System of Transformation and Development

The work process points out that in order to highlight the importance of real work practice in enterprises for the development of occupational competence, the project curriculum emphasizes that “project design should fully reflect the characteristics of local economy, and a large number of real projects from enterprises must be developed”, which is in line with the transformation goal of local undergraduate colleges and endures tests in practice. In order to avoid the embarrassment of simply turning to vocational education or falling into “neither vocation nor general undergraduate”, it is an effective measure to introduce the work process system into the curriculum development of transformational development and put it above the working process.

That is to say, on the one hand, students should be trained to independently excavate the extension of basic knowledge on the basis of mastering basic theory. The selection of curriculum content should get rid of the simple “employment-oriented” but the diversified career development path, in order to promote students to explore innovative and entrepreneurial paths independently. On the other hand, teachers are supposed to accumulate more enterprise experience, because the work process-oriented curriculum model emphasizes the design and importance of the process. This makes the final evaluation and assessment of students more difficult.

In instruction practice, classroom has been transformed from the traditional teachers-led classroom to students-led, an activity team that accomplishes tasks together, and students are the instructors and participants. Teachers also need to acquire cross-disciplinary knowledge and practical ability by constantly updating their knowledge and mastering job skills in enterprises in order to sublimate the work process from practice to theory.

Occupational knowledge varies from person to person in its construction relying on individual experience and personality. Schools need to closely cooperate with enterprises in talent cultivation. For instance, to develop a modern apprenticeship system in which the student is apprentice and the manager is master, guarantees students’ long-term skill learning from the master in the real production line. The apprentice combines the master’s exquisite technology, logic to deal with problems and other professional knowledge with his own knowledge in turn internalizing and adjusting his own knowledge structure [20].

6. CONCLUSION

The theoretical development of the work process system is relatively systematic and mature, and its application in Germany has got considerable achievement, but it still needs to be improved with the times in combination with the dynamic reform and development of Chinese educational situation, especially when it is applied to the reform practice of local undergraduate colleges. If it is not being endowed “in motion all the time” with a developmental philosophy, it will be inconsistent with Rauner’s definition. The current study fails to combine the work process-oriented model with other teaching models to form a three-dimensional framework, and fails to put forward the research of practical curriculum suitable for China’s national conditions, so it is difficult to better develop the methodology of the curriculum model. It requires further research on the restructuring of “application-oriented” curriculum for the development of local undergraduate colleges in China.

The teaching research oriented by work process does not closely integrate the dialectical relationship of interdependence and mutual promotion between classroom and extracurricular, school and factory. At present, there are many studies on curriculum development based on work process. However, the research on the mechanism of curriculum development needs to dig deeper. And the development mode is mostly based on vocational colleges, which needs to dynamically integrate with China’s educational reform and develop the application-oriented essence of work process system in local general undergraduate education. As an established system in Germany, it needs to be expanded vertically and horizontally after being introduced into China. It is also necessary to study and discuss its theoretical significance from the connotation and extension. Theoretically, China can broaden the academic vision from the perspective of philosophy, psychology and pedagogy [24]. To combine the Dewey Pragmatics and Empiricism with Chinese local higher education through the psychological experiments of cognitive representation may be of great help. From Dewey to his student Kilpatrick, there are fields worthy to dig from educational psychology for Chinese educators. Chinese scholars may ask why-not in reverse or opposite research direction. In addition, whether it has a broader sociological and economic significance is rarely touched yet.

Due to the different backgrounds of curriculum development between China and Germany, schools, as

talent suppliers, first of all should cultivate demand-oriented talent training ideas, and cooperate with enterprises to continuously improve curriculum construction and form sound curriculum ecology. In the process of application-oriented transformation, schools cooperate with enterprises to customize relevant courses. The sustainability of talent supply ensures stable supply and demand in the labor market. Secondly, they should combine the system with other curriculum models to achieve the overall goal of the Outline of Planning. Combining with the key tasks of the "Action Plan for Improving the Quality of Vocational Education (2020–2023)", schools will promote the pilot vocational education at the undergraduate level and promote the transformation of qualified general undergraduate colleges and universities into application-oriented ones. For example, to ensure the synchronization, symmetry and coordination of information at all levels in the aspects of degree setting, double-teacher certification and industry-education linking.

Specifically, it is necessary to conduct in-depth research from various educational systems in the light of China's national conditions, such as providing macro-policy and financial support at the level of higher vocational education, integrating curriculum units and groups, customizing demand-oriented curriculum structure at the micro level. Schools conduct in-depth enterprise research, combining economic and social development and external environment, and focusing on training high-level "craftsmen". To avoid staying in the textbook knowledge "behind closed doors", local colleges and universities should take the opportunity of transformation and combine the production process to turn these undergraduate colleges and universities into high-level application-oriented universities, in order to realize the sustainable development of industries or industrial clusters, accelerate the entry into the "China Smart Manufacturing" lane, and then serve the high-quality development of China. In the international comparison China should clarify the attributes of application-oriented undergraduate education with Chinese characteristics, and develop a curriculum system that is deeper and more extensive than vocational education. The development of applied undergraduate curriculum in China needs to highlight the "applied" and "high-level" connotation in the construction of work process-oriented system, in order to supplement and improve the work process theory. In practice, schools at all levels combine with the "apprenticeship" training mode to overcome the main difficulties in the chain of work process. Through learning-by-working, students will develop into craftsmen in key technical positions.

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