

Core Competence Oriented Vocational Senior High School Students Based on Curriculum Guidelines of 12-year Basic Education – an Initial Exploration of the Trend of Item R&D

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ABSTRACT

The Ministry of Education announced the Curriculum Guidelines of 12-year Basic Education (108 Syllabus for short) on November 28, 2014 and proclaimed in May 2017 that they would apply to students who would take the technological vocational senior high school entrance exam for the academic year 108. The curriculum guidelines for 15 career groups of technological and vocational senior high schools were declared formally in December 2018. The 108 syllabus was based on core competence for curriculum development, realization of screening students for entering TVE schools and inspection of students' learning achievements in TVE schools. 45-60 credits were adjusted for the required specialty and practice courses prescribed by the MOE. There were five subjects to be tested in the TVE Joint College Entrance Examination, including Chinese, English, math, Vocational Subject I and Vocational Subject II. The assessment was based on the learning content specified by the 108 Syllabus and question items were practically and diversely directed. Items were designed and presented in a systematic way and the ability of integrating disciplines and interdisciplinary subjects was focused. The Curriculum Guidelines of 12-year Basic Education were served as the foundation and the core competence to be developed on Chinese and Business Management in the TVE Joint College Entrance Examination was used as an example in this research. Items under study were described as follows:

1. items oriented by the core competence of the Chinese subject: specific goals to be tested, knowledge application in the classroom, emphasis on local themes and diversified texts and message retrieval, application and integration.
2. items oriented by the core competence of the Business and Management Group: integration of industrial practical experiences and lessons, solving problems by applying strategies and system thinking, extension and application.

The results and suggestions provided by this research may help teachers, students and parents of technological and vocational senior high schools to be concerned about the combination of learning and living, instead of a mere emphasis on subject knowledge and skills. Furthermore, they also can be served as a reference for adapting to the current life and facing the challenges of core competence oriented exam items and related researches in the future.

Keywords: Curriculum Guidelines of 12-year Basic Education, core competence, vocational senior high school, the 4-year TVE College Entrance Examination

INTRODUCTION

Core competence is based as the backbone of curriculum development to achieve the ideas and goals of the 12-year basic education and to profit the consistency among educational stages and integration of interdisciplinary subjects. The technological and vocational senior high schools (TVE schools for short) on the fifth learning stage of the 12-year basic education mainly provide general, special and practice courses to assist students in developing professional and practical skills, cultivating work ethics, improving cultural and technological capacities, developing creative thinking and adaptability to social changes, establishing a foundation for career development and enhancing employment capability of practical application (Ministry of Education, 2014).

The Testing Center for Technological and Vocational Education (hereinafter referred to as TCTE) has taken on drafting, setting up question banks, examinations, handling grades and studying on improvement related to 4-year and 2-year TVE joint college entrance examinations since 2001. TVE students of specialty groups accounted for 84.10% of the total candidates signing up for the TVE Joint College Entrance Examination of 2021. The 4-year and 2-year TVE joint college entrance examinations are divided into twenty groups (categories), including Chinese, math and specialty subject (1) for a total of 16 subjects and specialty subject (2) for a total of 20 subjects. The TVE joint college entrance examination is a test accepted by all technological colleges and universities for recruitment. Other channels include admission through recommendation and screening, and joint registration and distribution, etc.

The core competence of the 12-year basic education focuses on developing human-based life learners. As students are the subjects of learning, diverse intellects, interests and aptitudes should be considered for curriculum design so that their learning motives can be motivated and talents developed (Ministry of Education, 2014). Consequently, core competence directed courses for 108 Syllabus were developed to realize screening students for entering TVE schools and inspection of students' learning achievements in TVE schools. The purpose of this research was to develop core competence oriented exam items for the TVE joint college entrance examinations.

LITERATURE REVIEW

Core competence was proposed in the Programme for International Student Assessment (PISA for short) hosted by the Organization for Economic Cooperation and Development (OECD) in 2000, which aimed at 15-year-old students with three basic elements of reading, math and science.

The Ministry of Education announced the Curriculum Guidelines of 12-year Basic Education (108 Syllabus for short) on November 28, 2014 and proclaimed in May 2017 that they would apply to students who would take the technological vocational senior high school (hereinafter referred to as TVE schools) entrance exam for the academic year 108. The curriculum guidelines for 15 career groups of TVE schools were declared formally in December 2018. There were five subjects to be tested in the TVE Joint College Entrance Examination, including Chinese, English, math, Vocational Subject I and Vocational Subject II. As far as vocational subjects I and II were concerned, 15-30 credits (45-60 in total) were additionally adjusted for the required specialty and practice courses prescribed by the MOE in accordance with the new curriculum guidelines and the drafting scope of vocational subjects I and II for the TVE Joint College Entrance Exam of academic year 111 needed to be modified. Since the 108 Syllabus was declared officially in December 2018, the Committee of Recruitment Policy for Technological Colleges and Universities complied with the subject names and contents of the formally promulgated 108 Syllabus for drafting.

Core competence means the necessary knowledge, ability and attitude required for people to adapt to the current life and confront the challenges in the future. For core competence, learning is not limited to subject knowledge and skills, but the combination of learning and living through practice to manifest the whole personal development (all-around education/development) instead. The core competence in the Curriculum Guidelines of 12-year Basic Education focused on human-based lifelong learners and could be divided into three major dimensions, spontaneity, communication and interaction, and social participation. These three major dimensions could be further developed to nine main items, including physical and mental wellness and self-advancement; logical thinking and problem solving; planning, execution, innovation and adaptation; semiotics and expression; information and technology literacy and media literacy; artistic

appreciation and aesthetic literacy; moral praxis and citizenship; interpersonal relationships and teamwork; and cultural and global understanding.

Literacy items have been implemented overseas for a long time. To cope with the learning process in TVE schools, question items would be developed in compliance with the core competencies of 3 dimensions and 9 items in 108 Guidelines. Such items not only could meet the demand of talent screening for TVE colleges and universities, but also assess the learning performance of TVE students.

RESEARCH DESIGN AND IMPLEMENTATION

This research was conducted in a workshop approach. The learning contents of 108 Guidelines specified by the Ministry of Education were based. Items were practically, diversely directed and systematically designed. Subject knowledge and the ability of application and integration were stressed.

The drafting team consisted of 4-6 professors with teaching experience in related departments of colleges and universities and convened meetings for division of labor, coordination and workshop establishment prior to drafting. Tasks were divided according to the drafting process. Drafting principles of the test theory were complied for maintenance of item quality. The current drafting scope was served as the foundation and vocational practice subjects regulated by the MOE, prior knowledge required for admission of TVE colleges and the subject exam outline announced for the TVE Joint College Entrance Exam were all considered. The item R&D procedure began in May 2021. Several meetings for discussing, reviewing and modifying items were held for a presentation as well as a preliminary exploration of literacy oriented items for TVE students, which was exactly the objective of this study.

DISCUSSION

Core competence means the necessary knowledge, ability and attitude required for people to adapt to the current life and confront the challenges in the future (MOE, 2014). The lessons that TVE students learn at school should be applied to different scenarios and contexts; i.e. transfer of learning. Furthermore, practice orientation, ability integration and inquiry thinking are emphasized. In addition to basic knowledge and skills, application and attitude are more highlighted. Examples of literacy oriented items of Chinese and Business Management Group were explained as follows:

A. item example of Chinese literacy:

Have you ever wondered about the importance of a screw or a nut? 50 screws are required for a bicycle, 2,000 for a car and 1,800,000 for a Boeing 767 plane. Screws can be termed as the root of industry and there are a variety of screws for furniture, toilet tanks, railways and electricity, etc. Such professional division of labor is beyond our imagination. For instance, the torque control screws used for the Taipei 101 Building are the indispensable fasteners in a steel structure.

The export value of screws in Taiwan in 2017 was up to 43 billion US dollars and was ranked as the second largest exporting country around the globe. The most concentrated screw manufacturers are in Gangshan and Luzhu, Kaohsiung. A complete system of production line was established here, from forming, heat treatment, plating, packaging and transporting for export. All customers could be satisfied with this one-stop shopping here with an area of over 20 kilometers. It usually took several days or even few weeks to fine tune molds or machines in other countries; however, the experienced master workers in this place merely spent one to two hours finishing a tuning task. In 1960's, Chun Yu was the only screw manufacturer in Taiwan and 60% of the human resources in the screw industry came from it. Though manufacturers varied with their specialties; however, they helped each other through technological exchanges and contributed to positive recognition of Gangshan made screws in the international community.

The screw industry started at the end of World War Two and was greatly impacted by the low land and labor costs provided by the surrounding countries. A smart production line and high-value products would be the development direction for the next stage. Plenty of manufacturers began transformation. Some focused on vehicle fasteners and became supply chains of famous brands such as Tesla and Ford; some crossed over to the artificial tooth root market and had outstanding performance in medical screws; and the others applied the superb metal powder injection molding (MIM) technique to develop medical devices like Trapeziometacarpal joint implants and cervical plates, etc.

Screws used to be sold by the catty and the artificial tooth roots nowadays are sold by a single piece. The blue-collar manufacturers working together with the great white tower (medical field) moved towards the Silicon Valley of medical devices [The Comeback of Screw & Nut Industrial Clusters with a Global Perspective, adapted from Trade Insight, a biweekly].

Year	Output Value (NT\$ 1,000)	Direct Export Value (NT\$ 1,000)
2014	129,682,466	107,757,725
2015	127,295,884	107,418,483
2016	121,575,405	101,779,721
2017	126,831,854	106,002,622
2018	146,322,711	122,442,282

1. According to the passage, which isn't one of the characteristics of the screw industry in Taiwan?
(A) It was incepted during the era of Japanese Occupation with a long history. *
(B) Workers had excellent know-how, experience of many years and a quick response.
(C) Factories concentrated systematically for convenient purchase.
(D) Manufacturers had their own respective specialties and made exchanges.
2. Based on the description of the passage, which is true?
(A) A variety of screw types was stressed by 50, 2000 and 1800000.
(B) An analogy of Taipei 101 Building was used to indicate Taiwan had a top 1 screw output in the world.
(C) Chun Yu was served as an example to explain how the screw manufacturers in Taiwan were active in transformation.
(D) From sold by the catty to sold by a single piece magnified the high-level values of screw products. *
3. If the table on the right is added to the passage, which of the following can describe the message in the table most directly and properly?
(A) Due to the price fluctuations of global raw materials, the output value fell to a low point in 2016.
(B) The export volume reached to a new peak in 2018 and became the largest screw export country around the world.
(C) The output was increasing for five years and the amount was over 146,000,000 in 2018.
(D) The industry was export directed since the export value accounted for a high ratio in production value.

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※ explanation of Chinese literacy oriented item example:

- 1.The item described the development of the screw industry in Taiwan, which corresponded to the technological and vocational scenario. The information in this table could assess students' interdisciplinary ability of understanding the passage with a chart. Students were required to give a deductive answer by contrasting the article with the table.
- 2.Coping with the trend and rooting in the domestic country with a global vision corresponded to the core competence of an international view.
- 3.Reading comprehension through various expression approaches revealed learning performance.
- 4.Learning content was acquired by assistance of objective information.

B. item example of business and management literacy:

Answer questions based on the following passage.

Chen graduated with a major in computer science and engineering and a minor in accounting and got ready to open a coffee shop. His preparatory work was described as the following:

- (1) He made a loan of NT\$ 2 million as a venture fund from the bank at an interest rate of 6% for ten years and started to pay the interest only on a monthly basis for two years from the end of January 2018.
- (2) His mom provided a shop front, which was worth NT\$50,000 for a monthly rental to him for free.
- (3) He spent NT\$ 1 million on the machine, NT\$500,000 on decoration and saved NT\$500,000 for operation.
- (4) During preparation, he also took programming cases. On the average, he could get a case of NT\$50,000

worth every month and predicted the programming market would remain the same in 2018.

(5) He expected to open this coffee shop on January 1, 2018 and would manage it as his full-time job. The financial statements would be made at the end of each year.

1. According to the above, in which financial statement would the source and purpose of funds show? What were the current assets and current liabilities in the beginning of 2018 respectively?

	Financial Statements		Current Assets	Current Liabilities
	Item	Duration		
(A)	Income Statement	Flow	NT\$ 1 million	NT\$ 2.15 million
(B)*	Statement of Cash Flows	Flow	NT\$ 500,000	NT\$ 0
(C)	Income Statement	Reserves	NT\$ 1 million	NT\$ 2.1 million
(D)	Statement of Cash Flows	Flow	NT\$ 500,000	NT\$ 2 million

2. Chen paid a monthly salary of NT\$50,000 to Chang as the manager and provided a year-end bonus of double monthly pay. The monthly income reached to NT\$500,000 steadily; the cost of raw material amounted to NT\$300,000 and the bills of water, electricity, gas and phone cost NT\$50,000 on a monthly basis. Upon completion of the financial statements of the coffee shop at the end of 2018, Chen showed them to Yang, a bachelor of economics. In which financial statements could Yang see the pre-tax income? What might be neglected in the financial statements from Yang's economic aspect? Should the coffee shop continue running?

	Financial Statements		Financial Statements		To Continue		
	Item	Pre-Tax Income NT\$	Neglected	Cash Paid		Yes	No
				是 Yes	否 No		
(A)	Income Statement	NT\$ 980,000	Opportunity Cost		✓		✓
(B)	Statement of Cash Flows	NT\$ 1.2 million	Explicit Cost	✓		✓	
(C)*	Income Statement	NT\$ 980,000	Implicit Cost		✓	✓	
(D)	Statement of Cash Flows	NT\$ 1.2 million	Accounting Cost	✓			✓

※ explanation of business and management literacy oriented item example

1. A practical example of starting a business by a young man was simulated in the item. Professional knowledge of accounting and economics were used; financial statements of the coffee shop were made; the operating performance of the coffee shop was analyzed by costs and benefits in economics. Students could integrate the subject knowledge of their specialties in related practice cases and explore the decision of running a business, which realized the goal of putting learning into practice.
2. The abilities of logic thinking related to business and management specialties, applying technological information, identifying semiotics, communicating, interacting and coordinating and problem solving at the workplace with empathy corresponded to the core competencies.
3. The basic ideas and principles of accounting included the meanings and types of major financial statements, and the content of income statement. Cost-profit analysis in economics was conducted to reveal the management performance of the coffee shop.

The item example indicated Chinese literacy items were directed by industry or career background since specific testing objectives, knowledge application in the classroom, native subjects and diverse texts and

message retrieval, application and integration were emphasized. English literacy items were directed by subjectivity, interdisciplinary competence, diversified texts, daily life and message retrieval, application and inference. Business and management literacy items were directed by integrating industrial practical experience with everyday life, solving problems via applying strategies and logical thinking and extending application.

RESULT AND SUGGESTION

The results of the research indicated literacy oriented items had a few characteristics as follows: 1. subjectivity and interdisciplinary competence to solve the problem in the scenario and get hold of the subjectivity to be tested; 2. diverse material and texts to achieve the learning contents specified by the guidelines, diversified material, types, texts and item questions, which was similar to technological and vocational education; 3. problem solving in a suitable setting and systematized item design to acquire the competence required for problem solving on a certain learning stage via providing proper information, settings and assessment conversion and application, and 4. systematic item design to arrange items in a hierarchical manner and extend application from inside to outside the classroom.

To cope with competence directed items for TVE students during the learning process, the basic idea of assessment integration and application was mainly focused; however, primary knowledge from the books should still be mastered, reading strategies need to be used well, patience required for reading should be developed, practical operation and application need to be stressed and the speculation capability should be reinforced.

The results and suggestions provided by this research may help teachers, students and parents of technological and vocational senior high schools to be concerned about the combination of learning and living, instead of a mere emphasis on subject knowledge and skills. Furthermore, they also can be served as a reference for adapting to the current life and facing the challenges of core competence oriented exam items. The author expects to continue studying on literacy oriented question items to accumulate appropriate item capability in the future so that the feedback provided by the TVE testees could be further deployed as a reference for related researches.

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