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The Transformation of Online Teaching in Vocational Education: China's Situation, Problems and Countermeasures

Weiping Shi[1]

Abstract Teaching informatization and intelligence are important contents of vocational education in modern times. Among the challenges of new coronavirus (COVID-19) epidemic situation, the significance of online teaching in China's vocational education is further highlighted. Based on the data of questionnaire surveys and interviews, this study defines and pictures five problems of online teaching in China's vocational education, mainly focusing on the lack of information ability of the teaching subject, the insufficient applicability of online teaching programs, the insufficient preparation of online teaching content, the difficulty of managing distance teaching objects and the uneven quality of online teaching platforms. Compared with China, the Netherlands has accumulated rich experience in online vocational education and achieved remarkable results in hybrid learning environment and self-directed learning situation. Therefore, drawing on advanced experience from the Netherlands, the ways toward online teaching reform are presented which provide a theoretical basis for further reform practice.

Keywords vocational education, online teaching, competency-based learning, hybrid learning, self-directed learning

Introduction

Online teaching as a vital form of teaching information and intelligent reform has become an important trend in vocational education modernization and achieved remarkable progress in the construction of vocational education information and online teaching hardware and resource database. However, in early 2020, the COVID-19 has brought the most serious challenge to online vocational education in China. Facing the major threat of COVID-19 to public health and safety, the Ministry of Education proposed to postpone the start of the spring semester and ensure that "courses are suspended without suspension of teaching and learning". In the entire large-scale long-term online teaching, there are numerous problems in vocational education teaching, such as backward information literacy of teachers and students, absence of teaching philosophy and teaching methods and limitations of online teaching hardware and facilities. Now, online teaching serves a dual role in modernization of vocational education and response mechanism for public crisis, meanwhile, the reform of online teaching is not only to upgrade hardware equipment but to reform and promote online teaching ideas and concepts.

The Netherlands vocational education is trying to establish simulated working environment such as hybrid learning and autonomous learning under the initiative of the Het Innovative Arrangement, to increase learners' participation in classrooms and to promote vocational education and teaching reform. The practical experience of The Netherlands model is valuable for innovating online teaching mode of China's vocational education. With this study, we hope to contribute to greater understanding of the online teaching of China's vocational education, and develop a conceptual framework to promote online teaching reform.

1. The Status of Online Teaching in Vocational Education: An Empirical Study of Problems in China

After years of development, online teaching in China's vocational education has made great breakthroughs based on hardware, but other problems still persist. To effectively picture the practical situations, this study applied an online questionnaire to collect real-time data of online teaching from five vocational schools in Jiangsu Province during the epidemic period. Besides, to enrich the research data, five teachers were interviewed by random sampling. These teachers are from five vocational schools that have implemented all-round online teaching. The study learns about their actual behavior, related personal ideals, teaching attitudes, and uncertainties and dilemmas when teaching environment change. Based on literature research and data collected, the study summarized and analyzed five problems of online teaching.

1.1 The information ability of teaching

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subject is insufficient

Besides the hardware of teaching informatization, the most important factor for online teaching is the informatization ability of teachers, students and related subjects. During the outbreak of COVID 19, Chinese vocational education has to change into home-based online teaching in a complete sense, among which schools, teachers, students and parents are all important participants. The results of the online questionnaire show that the school is unable to carry out overall planning and rapid organization of information, and teachers' online learning abilities are also different. First of all, 42% of teachers feel anxious and find it difficult to adapt to the online teaching environment. The difficulties are manifested in not knowing how to deal with problems existing in equipment operation and how to interact with students online. Secondly, 38.54% of students cannot adapt to online learning quickly, and 37.1% have a low initiative in online learning, unable to timely transform their learning styles and states to face the intelligent learning environment. Finally, during the outbreak of COVID 19, parents as an important force also participate in online teaching. However, the survey results show that 52.4% of parents are not familiar with the operation of online learning. And they are "helpless" in assisting students to learn and weakly participate in home-school cooperation. Therefore, it is extremely difficult to implement online vocational education due to the lack of information capability of schools, teachers, students and parents.

1.2 The suitability of online teaching

programs is insufficient

Online teaching and service modes include "TV Teaching Video" mode, "Live Classroom" mode, "Access to Resource Class" mode, "Optional Resources + Online Q&A" mode. More commonly used teaching programs include online courses, live online teaching, students' independent learning, TV classroom in the air, etc. The commonly used teaching methods include live broadcast, recorded broadcast, flip and discussion. According to the survey, the top four teaching modes favored by teachers are presented in Figure 1.

Although the teaching form has been updated, the teacher's teaching plan has not kept pace with the reform of teaching mode. Analysis of the practical teaching situation revealed that the online teaching schedule is the same as the offline, without comprehensive consideration, evaluation and design for the teaching content toward different levels and disciplines. In the face of actual teaching requirements, teachers didn't adopt flexible and diversified teaching methods and the communication between teachers and students remain in a non-ideal situation due to the lack of technical conditions and personal information literacy.

1.3 The online teaching content is inadequate to the students' learning needs

The teaching process of vocational education becomes more complicated and emphasizes situational teaching even more. Therefore, it needs more effort to prepare the teaching content and materials for students' learning needs. However, the investigation shows that
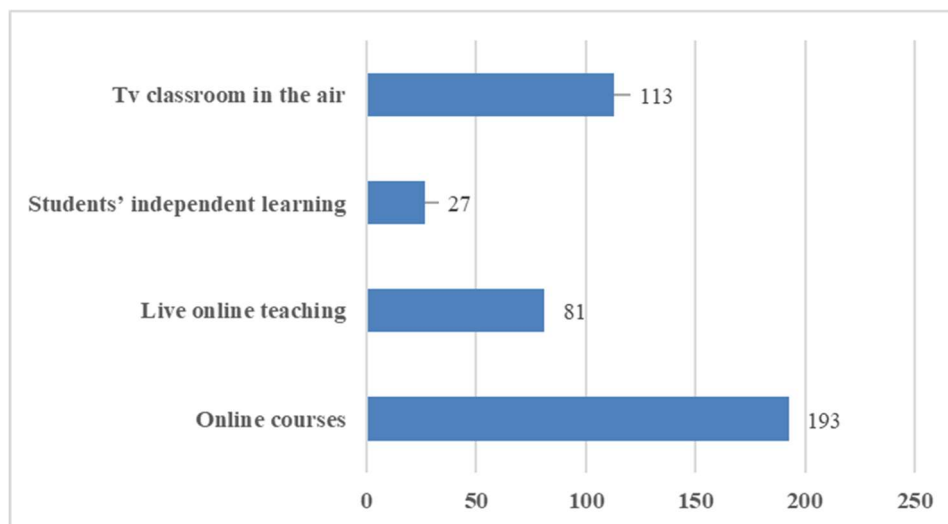
Figure 1

vocational education teachers are not fully prepared for teaching content. Three reasons that lead to this problem are summarized. One is inadequate preparation of knowledge points. Some special skills take higher requirements for the practical training environment and equipment, so it is difficult for teachers to express with remote technology. In addition, it is also difficult to reflect tacit knowledge in online teaching. Secondly, teaching aids and equipment needed for teaching are not fully prepared. Some curricula take higher requirements for practical training equipment and environment. Therefore, online teaching hardware equipment should be upgraded to meet more complex teaching requirements, meanwhile, teachers are required to have a high level of information literacy and sufficient teaching preparation.

1.4 The class Management of online teaching become more difficult

Compared with the traditional teaching model, online teaching mode has changed from face-to-face to line-to-line between teachers and students due to the change of teaching field and space. In traditional classroom teaching or practice training, teachers and students coexist in the same space and time, teachers can give full play to their authority, impart knowledge and skills to students and manage students' learning behavior more effectively. However, online teaching is spatially heterotopic. Although teachers and students are synchronized in time, they are relatively independent in space. This situation makes class management of online teaching becomes more difficult. The research found that during the outbreak of COVID 19, it is common that "some students are unable to attend the live class in time due to various reasons", "teachers are teaching in the studio, while the students play games and chat behind the screen". Therefore, due to the spatial displacement of online teaching, the time scale of the original synchronization between teachers and students will become out of sync. Once students are not self-disciplined enough, teacher's management of students is often "beyond reach" and "powerless".

1.5 The quality of online teaching platforms varies widely

Now, there are still some limitations in the platform and hardware of online education. First, there are many options for online teaching platforms, but the quality of these platforms varies widely. At present, the sources of online platforms in China mainly include the national public service platform for educational resources, the public service platform for provincial and local resources, the resources and platforms developed by educational institutions and the network platforms available for public use in the market. The online teaching platforms used by teachers from five vocational schools in Jiangsu Province are shown in Table 1. According to table 1, teachers have many choices in the online teaching platforms, but no one can meet teachers' all-round teaching requirements and ensure the stable operation of line.

Second, various online platforms are not at the same level of effect. According to the multiple response analysis of the research data, among the online teaching platforms with good effects, 35.63%, 33.77%, 5.04%, 0.93%, 16.23%, 5.97% and 2.43% respectively account for QQ Group, Tencent Conference, Learning Master,

Table 1

NO.	Tools	Percent
1	QQ Group	100%
2	Tencent Conference	29.8%
3	Learning Master	22.1%
4	Intelligent Education Cloud	16.9%
5	Tencent Quick Class	7.8%
6	DingDing App	3.9%
7	Huya Live	2.6%
8	China MOOC	1.3%

Intelligent Vocational Education Cloud, DingDing App, Huya Live and China MOOC. Therefore, although there are many online teaching platforms to choose, none of them can meet the diversified and complex needs of online teaching in vocational education.

2. Reform of Vocational Online Education: Practical Experience of the Netherlands Model

The Netherlands' vocational education and training have three objectives: to facilitate the acquisition of skills by young people, to facilitate continuing education and to promote the quality of citizens [1]. In order to achieve these goals, the Netherlands has promoted the revolution of the online learning environment of vocational education [2]. First, the construction of Hybrid Learning Environment, which realizes the integration of online learning and in-school learning. Second, the establishment of Self-directed Learning Environment, mainly involving the degree of autonomy toward learners entering and receiving vocational education courses. These two learning environments have become the cornerstone of practical teaching in contemporary s vocational education and training.

2.1.1 Development of the hybrid learning environment of the Netherlands vocational education

It is not easy to plan and design a hybrid learning environment. The first step is to analyze the real tasks that make up the content of learning environment and break down the tasks into smaller parts. The second step is to use four perspectives for the next decomposition in the design process. One of the basic elements of a hybrid-learning scenario is a "real task" from specific areas such as architecture, technology, hospitality, health care, sports, and leisure. Through information technology and intelligent technology, real tasks are sorted and re-transformed to realize the interweaving of working process and learning process. Teachers motivate learners' active learning process by guiding them to solve real tasks or abstract professional tasks, so that learners can consciously integrate learning and work.

2.1.2 Three reforms in the hybrid learning environment of the Netherlands vocational education

In the hybrid learning environment of vocational education, there are three key reforms. First, the occupational experience changes of agency. In the virtual space of hybrid learning, the roles of teachers and students are transformed to representatives of practitioners and clients. They participate in all professional roles related to a certain profession to learn professional knowledge and skills by playing the roles of different behavior and positions. Second, spatial function expansion and transformation. With the support of modern information technology, the hybrid learning environment can not only reflect the real workplace but also provide appropriate space from the perspective of education. This space can be used for both knowledge acquisition and practical participation, and should also have many other functions. Third, a temporal transformation. The perspective of time aims to clarify the time setting of the hybrid learning environment, including the available time, time sequencing, time scheduling, acceleration and deceleration related to work tasks.

2.1.3 The role of teachers in the hybrid learning environment

Teachers help learners grow into professional or vocational talents by focusing on building model strategies and scaffolding strategies in teaching. To be specific, there are seven kinds of roles: first, adaptivity. The teacher should make it clear that teaching behavior is a response to teaching goals, conditions, learners' environment and characteristics. Second, expansion of tasks. Teaching activities not only include direct interaction with learners but also require teachers to design extended activities, diagnose, assess and organize activities, as well as cooperate with other teachers and coaches. Third, modeling. To demonstrate how to do and how to think, to clarify the discussion of problem-solving strategies and ideas. Fourth, coaching. Important guiding methods include support for exploration and cooperative learning, feedback and support around reflective activities. Fifth, monitoring. A teacher should act as a

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supervisor in the process of metacognition and emotion. Sixth, guiding. Teachers construct multiple learning activities and approaches through a series of transparent choices. Seventh, scaffolding. Teachers put up scaffolding for each learning stage and remove the scaffolding after students acquire the skills and then repeat the process.

2.2 Self-directed learning environment: learning-centered online teaching practice

The Netherlands vocational education online teaching is not only to realize the change of the hybrid environment in learning space, but always adheres to "learning-centered" on the teaching ideas, by creating the self-directed learning environment to help the students in vocational education spontaneously confirm learning needs, set learning goals, and determine the required manpower and material resources, select and implement appropriate learning strategies, and evaluate the results of learning.

2.2.1 Design for self-directed learning environment of vocational education

The self-directed learning environment is not derived from vocational education but is widely used in the Netherlands education institutions. First of all, learners select one learning task or more to perform from the task database of online learning. According to the evaluation criteria, the data of task evaluation are sorted into the portfolio. And then, in the next cycle, learners formulate or reformulate their individual learning needs, set new learning goals, and then choose appropriate follow-up tasks based on the evaluation information provided by the portfolio. Teachers or computer systems use counseling protocols based on counseling models to support and guide learners in developing learning needs, setting learning goals, and selecting new tasks so as to optimize the development of specific domain skills and self-directed skills [3]. Therefore, when developing the self-directed learning environment, development elements mainly include [4]: (1) learning tasks with metadata; (2) development portfolio; (3) advisory models. Among them, learning tasks with metadata and development

portfolios are directly related to performance, learning goal setting, resource selection and other activities. The development portfolio not only covers the evaluation results of reviewers, but also includes learners' self-evaluation. By comparing the evaluation results, learners can gain more experience in self-evaluation and have a deep understanding of their own progress or shortcomings. The counseling model provides explicit guidance and support for learners and the rule bar indicates the amount.

2.2.2 The principle of online teaching in Self-directed learning environment

New teaching principles adopted make learning more active in the self-directed learning environment. These principles include three points: first, the principle of authentic setting [5]. The principle of authentic setting should be embodied in introducing the real environment of workplaces into schools, that is, learners should not only learn the subject knowledge, but also understand the real working environment including the working attitude of cooperation and communication. Learners accomplish tasks by taking on different roles in the self-directed learning environment, such as assistants who organize or manage tasks and cooks who store and distribute food and kitchen utensils. Second, the principle of integrating theory with practice. The self-directed learning environment provides learners with the possibility to apply knowledge and skills in practice-oriented environment. By learning theory, learners can better accomplish practical tasks. In addition, through these experiences, learners are more likely to imagine further education and future work environment. Third, the principle of adaptive learning. Although every learner is regarded as an active participant, the ability of self-directed learning varies among them. Therefore, the development of the self-directed learning environment should also consider the learning level and speed of learners. First, learners know their own advantages and disadvantages through the self-assessment, then choose the appropriate learning tasks from the previous experience and knowledge and plan the learning trajectory and process, finally develop a worksheet to integrate the theory into the learner task.

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2.2.3 The role of online teaching teachers in the self-directed learning environment

In the self-directed learning environment of vocational education, teachers should foster learners' self-directed ability by stimulating and supporting learning [6]. Firstly, giving feedback. By focusing on the learning process together with learners, teachers can promote learners' self-directed ability and achieve the ultimate teaching goals. Secondly, providing direct instruction in SRL (Self-Directed Learning). The teachers' teaching behavior, such as clarity and speed of teaching, are to some extent influence the development of self-directed ability in learners. Thirdly, increasing the responsibility of learners to become self-directed. Specifically, modeling through explanation and demonstration, stimulating learners' participation by asking questions, involving learners of topics, etc.

2.3 Experiences of online teaching in the Netherlands Vocational Education: Autonomous Reform in the Virtual

From the perspective of the concept and practice of learning environment reform in vocational education, advanced concepts not only help overcome many shortcomings in the current vocational education, but also practice well and achieve certain results. From the perspective of practical reference, there are three main experiences in online teaching of vocational education.

2.3.1 Combine online and offline, and construct workplace learning environment based on information technology

The online teaching of vocational education in the Netherlands is not completely separated from the offline teaching, but a virtual learning environment designed to assist the offline vocational education. On one hand, the combination of online and offline not only retains the experience and advantages of traditional teaching mode but also makes full use of information technology to apply intelligent and information-based modern teaching means into teaching practice. On the other hand, the online teaching relies on information technology to construct the workplace learning environment and to transplant the real environment tasks of workplace to students. It has important implications for the online teaching of vocational education in China. First, do not just for the

sake of teaching online, and use technology is just for the sake of technology; Second, online teaching of vocational education should not be separated from offline teaching, but should be combined with to realize complementary advantages; Third, the simulation and virtual functions of information technology should be given full play and help introducing real environment of the workplace into students' learning classroom.

2.3.2 Combine autonomy and interaction, use environment and tasks to mobilize students' initiative

Students' autonomy and self-discipline level are important factors that affect the effect of online teaching of vocational education. On one hand, students' autonomy and self-discipline are related to the extent to which students and teachers devote themselves to learning in the ectopic learning space. On the other hand, they are also important prerequisites for teachers to implement remote monitoring and management. The Netherlands vocational education online teaching uses tasks and evaluations to mobilize students' initiative and realizes the organic combination of students' autonomy and teacher-student interaction. In hybrid learning environment, the virtual reality environment in workplace is used to stimulate students' learning enthusiasm and give play to students' initiative through changes of roles, space, time and tools. In self-directed learning environment, learning tasks with metadata, development portfolios and advisory models constantly stimulate student's learning state, applying the principle of authentic setting, the principle of integrating theory and practice and the principle of adaptive learning to provide support for learning, to carry out the "online learning-centered" teaching idea and concept.

2.3.3 Combine guidance and assistance, constantly change the role of teachers according to the teaching requirement

In Herbart's era, teaching was "teacher-centered", but in Dewey's educational world, "children are the center of teaching". Nowadays, with the continuous development of science and technology, enrichment of teaching methods, and growth of various types of teaching modes, the key issue of teachers' professional development is what role teachers play in teaching. In the reform of the Netherlands vocational education learning

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environment, teachers have various duties in hybrid learning environment and self-directed learning environment. It can be said that the role of teacher is more multifunctional and all-round. Teachers should constantly change their roles according to learning needs to help and serve students in teaching. Although the role of teachers in online vocational education is very diverse and changeable, the most fundamental role is still to guide and assist.

3. The Mode Transformation of Vocational Education Online Teaching

After the outbreak of COVID-19, it is imperative to reform and upgrade online vocational education in China. However, under the premise that the hardware construction of vocational education informatization has achieved good results, the online teaching should learn from the experience of the Netherlands and focus on reforming the concept and paradigm of it to explore the Chinese characteristics mode in the reform of online teaching of vocational education.

3.1 Innovate the design mode of online teaching

Online teaching is not the "online repetition" of traditional teaching, it should be transformed into a teaching mode that accords with the characteristics of vocational education types based on general online teaching. In the teaching practice of The Netherlands vocational education, the emphasis on creating a hybrid learning environment lies in the transformation between work tasks and learning tasks. In the virtual learning space, the task transformed into a planned, purposeful and organized way and comprehensively strengthen students' self-directed learning. These experiences could deal with the inadaptability of online vocational education programs and the management of teaching objects in China. In the future, there should be three innovations of teaching design for the reform of online teaching mode of vocational education in China. First, the online teaching of vocational education should be regarded as a long-term strategy for the modernization reform of vocational education. Second, it is necessary to make full use of information technology to establish the virtual learning space in the workplace and create meaningful learning space for students. Third, it is necessary to construct self-directed online learning environments fully mobilize students' autonomous initiative.

3.2 Strengthen the guidance standard of online teaching

The key to the reform of online teaching mode in The Netherlands vocational education is to succeed in transforming teachers' roles and behavior. From the current environment and problems of online teaching of vocational education in China, the standardization of teaching is the first priority of reform. Therefore, the reform should regulate teachers' teaching behavior first. To be specific: First, teachers in vocational schools need to control their own courses so that they can be presented flexibly in different learning environments, which apply to disciplines with organizational rules as well as other interdisciplinary fields. Secondly, teachers in vocational schools should adjust subject knowledge according to learning needs and actual learning environments and play the role of "guide". Thirdly, teachers should know when to stimulate learners' self-directed ability and judge, locate learners' best learning ability and be a good "booster" of learning. In addition to the core norms of teaching behavior, a systematic and standardized Online Teaching Guidance Manual is needed for teachers to learn in innovation of the online teaching mode of vocational education in China.

3.3 Enhance the autonomous learning ability of learners

Vocational education students are facing a complex career world. Therefore, vocational education should pay more attention to improve individual learning ability while focus on enhancing learners' professional skills. Surveys during the outbreak of COVID-19 show that vocational education students with low self-discipline lack autonomous learning ability and habits, which restrict the reform of online teaching in China's vocational education. It is showed by the experience of The Netherlands vocational education that the key is to create a self-directed learning environment and enhance learners' self-directed learning ability. The administration in the Netherlands is trying to decrease the dropout rate of vocational education by improving learners' self-orientation, which may have implications for the reform of online vocational education in China. Specifically, schools should create a self-directed learning environment while teachers give learners appropriate support and feedback to guide them to plan their own careers.

3.4 Improve the information literacy of various subjects

The information literacy of principals, teachers, students and parents is directly related to the success of vocational education online teaching reform in China.

The investigation during the outbreak of COVID 19 shows that the first problem of online teaching of vocational education in China is the lack of information ability of teaching subjects. The high level of information literacy on all relevant subjects supports the success of the Netherlands counterpart. Therefore, Chinese vocational education needs to improve the information literacy of various subjects. First of all, for front-line teachers, it is necessary to strengthen the training of teachers' informatization ability and assess the ability regularly to ensure it keeps pace with the times. Second, for students, it is urgent to change the learning mentality of online teaching and establish the learning concept of "formal course". Third, for parents or other relevant subjects, follow up on the pace of information teaching and online teaching and become an eligible learning "support group".

3.5 Optimize the online teaching conditions of vocational education

Although China's vocational education online teaching conditions are good, it also faces that the quality of online teaching platforms varies widely. From the experience of The Netherlands reform, we can find that it is essential to establish learning tasks with metadata, development portfolios, advisory models and other learning and teaching resources and platforms. Therefore, it must also optimize the vocational education online teaching conditions. To be specific, firstly, taking online teaching as an important task of vocational education modernization reform based on the long-term development of the overall system thinking. The second is to increase the investment of funds and equipment in online teaching of vocational education to consolidate the material foundation of the online teaching reform. The online teaching reform of vocational education needs to optimize and upgrade the equipment and hardware, which connected with the investment of the state, government, colleges and society. Third, do a good job in vocational education online teaching services and support. Reform school hierarchy, implement flat management and establish a core team including management, teaching and research and technical support. Therefore, good online teaching in vocational education require sufficient support from policies, resources, tools, training, guidance and evaluations to drive teachers and students to complete self-organization and self-management.

Adaptation Factors of ICT Tools in TVET Education during Pandemic Covid-19 Movement Control Order: An Investigation in Private TVET Institutions in Klang Valley

Theepa Paramasivam[1], Navaratnam Vejayaratnam[2], Shri Dayalam James[3]

Abstract Adapting Information and Communications Technology (ICT) in teaching and learning pedagogy became a highlight during the crisis due to Pandemic Covid-19. Majority academic and research institutions had been adopting the curriculum pedagogy delivery through conducting online lectures, tutorials, presentations, consultations and etc. Technical and Vocational Education and Training (TVET) adopted the same approach in keeping sessions online during this challenging moment. However, the suitability and effectiveness between the types of TVET courses with the implementation of online teaching and learning strategies raised questionable doubts about the driving factors of adapting ICT in TVET education during Movement Control Order (MCO) due to Pandemic Covid-19 crisis. Even though some parties welcomed this sudden transition, needs arose to investigate further the adaptation factors of ICT in TVET education by contacting the TVET educators and trainees. The research objective is to find out whether sufficient strategies implemented along the way while engaging educators and learners in online sessions by utilizing ICT tools in promoting effective teaching and learning pedagogy. Survey questionnaires is distributed to the TVET educators from various private TVET institutions in Klang Valley. Number of 120 participants were chosen based on simple random sampling technique, with SPSS version 25 is adopted in conducting descriptive statistics for this research. Research findings are anticipated to reveal the factors and gaps that need to be paid attention to in adapting ICT for TVET teaching and learning pedagogy.

Keywords Adaptation factors of ICT, ICT tools, TVET educators, TVET trainees, Teaching and learning pedagogy, MCO

1.0 INTRODUCTION

Learning theories in 20th century include behaviourist, cognitivist and constructivist learning theories in moulding pedagogies needed in establishing understanding among learners (Harasim, 2012). Behaviourist learning theory explains about the actions, psychology and learning through repetition and replication in the process of determining our actions that result in the changes happening in our life, associated with Ivan Pavlov (1849-1936) and Burhuss Frederic Skinner (1904-1990) researches. This learning theory later on embedded into current methods of learning technologies included computer-assisted instruction.

According to Harasim (2012), behaviourist theory's limitations had introduced cognitive learning theory, indicates learners' mind ability in processing information just as computer does, referred to as cognitive information processing (CIP). Subsequently, constructivist learning theory represents the way learners provide

meaning to the knowledge that had been learnt throughout the course and how it can be connected to their daily life by experiencing and reflecting aspects they are contributing to the environment. Developed by Jean Piaget and Lev Vygotsky, constructivist theory enable learners to learn by asking questions, making relations, assessing information and interacting the information with another learner for better understanding.

Transition happens whereby the 20th century learning theory embedded into 21st century online collaborative learning (OCL) theory (Harasim, 2012). Even though OCL was developed on basis of behaviourist, cognitivist and constructivist learning theories, it had emerged computer networking and the Internet, transition from Industrial Revolution 3.0 to Industrial Revolution 4.0. Transmission of knowledge by educators and knowledge acquirement by the learners which can be practically applied in daily life based on 21st century opportunities and needs, are highly emphasized. Human communication paradigms evolved from speech to messages sharing through writing, whereby formal learning initiated through literacy and numeracy skills.

However, invention of printing and expansion of mass communication made the human capability broaden up in sharing ideas across societies through mass education during industrial age. Communication evolved further to Internet information technology interactions as powerful and boundaryless method in

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integrating education and training. Telecommunications revolution, inventions of computer networks and the World Wide Web had initiated online information sharing facilitation among researchers, scholars, educators, students, business people and others, which had contributed towards Online Learning (OL) for delivery of courses, projects, researches, group collaborations, resources searching, sharing and access through online educational applications.

Further discussed by Harasim (2012) about online learning, three categories were emphasized namely adjunct mode, mixed-mode or blended-mode and totally online learning with the embedment of Information and Communication Technology (ICT) tools in teaching and learning activities. Adjunct mode online learning is an enhanced version of traditional face-to-face (f2f) education whereby Internet is being used as a complement to search for information, send e-mails, engage in quizzes and so on. Mixed or blended mode online learning has substantial impact as 50% or half of the course activities are made online, engaged the learners' participation actively. Totally online learning or also known as fully online learning refers to teaching and learning activities handled virtually, embedded with multimedia elements, enhances educators' and students' engagement, collaboration, knowledge gaining and sharing without the need to be physically being present in the institution, which is currently adapted during Pandemic Covid-19 crisis.

Research by Abdullah et. al (2020) had stated that TVET education is uplifting the semi-skilled and skilled male and female workforce to ensure the reduction in unemployment rate in a country. The research had highlighted life and career multidisciplinary skills namely flexibility, adaptability, social, cross-cultural, leadership, accountability, productivity and responsibility should be able to be embedded in TVET education. Hereby, wish to add on that mentioned skills can be also added on with ICT elements in teaching and learning delivery strategies to ensure the TVET trainees able to survive in 21st century employment compatibility.

Agbo and Okwudili (2018), studied about adaptation of e-learning for effective TVET courses delivery and the need for trainers and trainees being exposed in further e-learning related trainings. Learning facilities were highlighted as could be a hindrance factor in adapting e-learning across the TVET courses. Application of teaching and learning activities through e-learning platform by collaborating hardware and software, internet connectivity, social media networks, webinars and other online learning integration has to be in alignment with the current technological development and educational practices, especially during transition in experiencing

Pandemic Covid-19 crisis. The need for transition from traditional classroom teaching and learning to online sessions has to be implemented immediately since the end of March 2020 in Malaysia as Movement Control Order (MCO) due to Pandemic Covid-19 imposed by Malaysian federal government in order to take preventive measures controlling the spread of the virus.

According to Balakrishnan et. al. (2019), skills development and integration of ICT are crucial to upskill the current TVET trainers and trainees to ensure lifelong learning through formal, nonformal, open, distance and virtual learning strategies. This matter will be able to improve society's quality of life socially, economically and technologically as the rate of computer illiterate trainers and trainees will be reduced tremendously. Eventually, this practice will be in alignment with the United Nations Sustainable Development Goals in civilizing quality of education while preparing the community in adapting IR 4.0 and IR 5.0 employability skills.

The adaptation of fully online educational activities during Pandemic Covid-19 crisis, pushed almost all higher, including TVET education providers, to deliver courses online. This transition is in alignment with the Higher Education Ministry's announcements 16th March 2020 as reported through Malay Mail online (Lim, 2020) and subsequently reported by New Straits Times online on 3rd October 2020 (Solhi, 2020) as an effort in curbing the spread of Covid-19 virus among higher learning education learners. The urgency and immediacy in adapting online sessions caused tension to various parties such us among educators, trainers, learners, trainees, institutions, ministry and parents. Trainees are able to participate in course learning activities from home, till to-date. This matter enables trainers and educators to upkeep their learning progresses even though there is no face-to-face meet up. In addition, engagement into online delivery sessions enhances trainees' learning spirit on par with their course completion progress. Although online delivery sessions seem to provide positive effects, some issues need to be resolved, such as readiness of trainers and trainees adapting ICT tools while engaging themselves in teaching and learning pedagogy. An unstable network, trainees are not equipped with needed devices for learning engagements, low level of computer literacy are among known challenges while adapting online teaching and learning pedagogy.

Al-Jaraideh (2020) highlighted the obstacles that were experienced while adapting ICT tools in teaching and learning pedagogies in secondary level, which had exposed that majority teachers are still comfortable in engaging themselves in conventional delivery methods. Thus, previous researches, mostly in academic and few

in TVET educational practices, investigated and revealed that ICT played major roles in teaching and learning pedagogy. However, various challenges such as lack of expertise, insufficient funding, inadequate ICT tools and poor facilities were faced during implementation of this effort, particularly in TVET programmes were highlighted. Therefore, further investigation is needed to study the adaptation factors of ICT in TVET education, especially when sudden transition from teacher-centred to student-centred online learning had taken place.

1.1 RESEARCH QUESTIONS

This research intends to answer the following questions:

1) What are the levels of attitudes among TVET educators in adapting ICT tools?

2) What are the barriers in implementing ICT tools during the Pandemic Covid-19 crisis?

3) What are the technology integration strategies applied in teaching and learning activities among TVET educators?

The above-mentioned research questions were studied to identify the attitudes towards adapting ICT tools in TVET courses online delivery. Besides that, barriers in implementing ICT tools, especially during uncertain moments of Pandemic Covid-19 crisis is being highlighted. In addition, technology integration strategies throughout the TVET courses delivery during the pandemic moments was also investigated.

2.0 LITERATURE REVIEW

2.1 ADAPTATION OF ICT TOOLS

Adaptation of mobile learning applications in mainstream academic courses had been part of teaching and learning pedagogy delivery for long. However, usage of mobile learning applications in TVET is questionable as TVET courses teaching and learning delivery requires practical involvements by both the trainers and trainees, unless the courses are related to ICT, in example, e-commerce, networking, software development and others. Indicated in an article written by Prof. Dr. Ramlee Mustapha through New Straits Times online on 13th July 2020, students stress level escalated as learning environment at home is less promising compared to the environment provided in higher learning institutions. Engagement through online learning became more challenging due to network issues, students have to adapt independent learning, unable to understand the course delivery, the usage of devices are not on par to assist in teaching and learning environment and the challenges goes on.

Akom, Asante and Adjei-Frimpong (2016)

revealed that TVET educators and learners are interested in using ICT tools in teaching and learning pedagogy in alignment with current technological development to cope with Industrial Revolution 4.0 and Industrial Revolution 5.0. Though, government intervention is needed to apply appropriate policies as institution face financial issues, poor quality of ICT educators, insufficient ICT tools and computer laboratories, subsequently made the courses delivery challenging. Thus, there is a need to study this matter further and in depth to plan, engage and train the educators in using ICT tools in TVET education.

Study by Wang, Ng and Towey (2018) highlighted that social networking sites (SNSs) such as Google, LinkedIn and Facebook provide basic and commercial learning services for effective collaborative learning in tertiary institutions in Nigeria, especially among lecturers delivering the TVET courses. They found 13 primary hurdles in adapting social networking sites effectively in teaching and learning pedagogy. Therefore, suggestion arose for TVET lecturers to participate in continuous professional development (CPD) which would enhance the soft-skills development in smooth delivery of the courses through mobile learning applications.

Chi, Tu and Minh (2020) stressed on online teaching competence needed by the educators in training institutions by adaptation mindset in implementing and engaging trainees to online learning. They had highlighted the needs of specific training for educators in enhancing teaching performance and improve learning abilities throughout the course delivery process to cope with the current trends, especially during crisis such as surviving through Pandemic Covid-19, teaching and learning pedagogy being implemented online during Movement Control Order (MCO) immediately. During this stage, the transition creates various barriers in utilizing ICT tools in teaching and learning pedagogy due to multiple factors such as the readiness of the educators and learners in online learning, insufficient soft-skills competency, poor network issue, lack of devices and several others.

Kanwar, Balasubramaniam and Carr (2019) emphasized in association with digital revolution, TVET courses should focus on innovative application of ICT tools in lifelong learning in order to prepare the learners readiness engaging in career related to ICT job scopes. Continuous upskilling and reskilling are required while integrating technology to TVET education systems. They had recommended dual systems implementation, community-based learning through social medias, ICT tools adaptation in teaching and learning pedagogy innovatively, TVET educators' training needs in preparing them ready to adapt the paradigm shifts in alignment

with Industrial Revolution 4.0 and Industrial Revolution 5.0, and last but not least, career advancement recognition prior to learning in preparing the trainees stepping into the employment environment equipped with the necessary skills to survive and uplift their quality of life which contributes towards development of the nation.

2.2 ENGAGEMENT OF EDUCATORS AND TRAINEES

Active participation of vocational educators and learners were discussed in the research by Saripudin et. al. (2019). Vocational educators and learners seem to engage positively in multiple digital media collaboration throughout the learning delivery. Learners boredom and disengagement were able to be eliminated. However, the researchers also identified the several issues to be paid attention while implementing mobile learning. Again, poor network issue, lack of institutions' facilities and digital literacy policy, limited exploration of ICT tools, educators' competency in handling ICT tools and time constraints were addressed. Therefore, there is a need to identify methods to blend ICT tools effectively in TVET education which is become an important arm in lifelong learning education.

Paschek et. al (2019) had indicated that digitalization of the societal activities, especially in business is crucial in transiting from Industrial Revolution 4.0 to Industrial revolution 5.0. Integration of latest technological development through artificial intelligence (AI), cloud technologies, virtual reality (VR), Internet of Things (IoT) and robotics are modifying human integration evolution. In addition, emergent intelligence is adapted in research by Skobelev & Borovik (2017), highlighting the needs to collaborate multiple technologies related to intelligence preparing oneself to be able to sail through Industrial Revolution 5.0 technologies and societal development.

2.3 INFLUENCING FACTORS OF ICT TOOLS

Okoye and Nkanu (2018) researched about the influencing factors of ICT tools integration in TVET education. The requirements of TVET courses indicating practical delivery approaches through appropriate competencies. Adaptation of ICT tools in teaching and learning pedagogy is alarming in preparing the trainees for the real-world 21st century employment. Needs of educators' training in ICT integration as the primary factor, institutions' policies to encourage educators' engagement in blending ICT tools in teaching and learning pedagogy, educators' attitude towards integrating ICT in TVET courses, poor ICT and basic infrastructures,

unstable network and deficiency in financial support were highlighted.

Chan and Mohammad (2019) indicated through research about ICT integration practices that educators' knowledge while delivering courses related matters online is essential by obtaining effective adaptation of ICT tools. Embedding ICT tools application trainings as a part of the educators' professional development, uplifting technology operational competency, interest and instructional practices are crucially in need to be paid attention. ICT tools assisting communication between the educators and trainees also being stressed by the researchers in making the transition from conventional to online teaching and learning strategies application in TVET education.

Referring to the above researches' discussions, there are several grounds to study the adaptation factors of ICT tools among educators and trainees for TVET courses. Trainings, competencies, planning and policies roles in advancement of the courses online has to be discovered as well. Financial assistance, infrastructure for ICT tools usage effectively and innovatively has to be identified and upgraded. In addition, this research is able to guide approaches and attitudes educators able to implement and learners' adaptation while integrating ICT tools in teaching and learning activities.

2.4 ICT BARRIERS

Educators attempt to use computer was considered one of the most vital variables while integrating ICT tools in the curriculum. Several obstacles affect computer integration in teaching and learning activities, in such time constraint, access to sufficient number of computers and lack of support by educators and administrative teams were highlighted. Therefore, this study further confirms the main obstacles faced by educators while engaging in TVET courses delivery online. It is important to understand the reasons behind using or not using computer in instructional practices by the instructors before implementing ICT in educational system. According to Zhao & Cziko (2001), reasons includes the lack of technical and administrative support for the teachers, lack of appropriate trainings provided for them, lack of systematic irregular incentives, institutional infrastructure, and limitations created by the existing traditional pedagogical were indicated as hindrance in ICT tools adaptation.

Study conducted in the United States by Becker and Ravitz (1999), stated that the rate of teachers who are considered reluctant or late adopters of computer-based instruction methods is about 70%, which is quite highly indicating the challenges. Moreover, another reason that

may affect the novice teachers' attitude towards instructional technology adaptation is lack of leadership by experienced teacher, they don't find another experienced teacher to lead by example. Constraints created by timetable, poor or inappropriate software used, or the unavailability of computers due to insufficient infrastructure were also stressed (Dunn and Ridgway, 2008).

Becker et al., (1999), added that teachers who have low skills in using computer found difficulty in embedding technologies in their learning strategies. Their anxiety level is high as mental visualization being afraid of technology could interrupt the teaching process and they are unable to control or manage the software accordingly while delivering courses. The researchers also suggested that appropriate training should be provided for the educators to master certain technology in adaptation of e-learning context. The suggestions by past studies do supports the current situation of Pandemic Covid-19 crisis which requires or no choice for all levels of educators from elementary to higher learning, inclusive of TVET education to implement online teaching from their home workstation.

3.0 METHODOLOGY

This is a quantitative and descriptive study to measure the level of ICT implementation among the TVET educator during the pandemic. The unit of analysis for this study will be the TVET educators from 5 private vocational institution in Klang Valley. About 120 questionnaires was distributed through online during the Pandemic Covid-19 lockdown. The questionnaires were adapted from the past studies such as Computer Attitude Scale (CAS), an instrument used to access educators', learners' and administrators' attitude towards computer adaptation. The validity and reliability of CAS has been tested in numerous studies (Loyd & Gressard, 1984).

There are five subscales consists of liking of computers, confidence in using computers, comfortability, competence and usefulness. The obstacles scales developed by Lancaster (2000) was been adapted to measure the barriers in implementing the ICT. Likert scale was used in this study so the individuals indicates the degree to which they agree with the statement on five-point scale, with "agree strongly" on one end and "disagree strongly" on the other, each response is given a value of 1 to 5, with five indicating that this item is considered as a serious obstacle for the teachers when they are integrating computer in curriculum. The items for strategy of technology integration were adopted from Moersch's (1995) Level of Technology Implementation (LoTi) Questionnaire.

4.0 RESULTS

The descriptive and inferential analyses which provide answers to research objectives 1- 3 are presented

Table 1: Level of Attitude towards ICT tools

Dimensions	Mean	Level
Working with computer would make me very comfortable	4.63	High
I have a lot of self-confidence when it comes to work with computers	4.55	High
I think working with computers would be enjoyable and stimulating	4.48	High
Knowing how to work the computers will increase my job possibilities	4.37	High
I'm willing to learn new software to enhance my teaching	4.45	High
Overall Attitude towards ICT implementation	**4.50**	**High**

below. The researcher refers to the interpretation scale by other researchers in interpreting the research findings. Mean score is used as a reference and is interpreted based on the mean score interpretation scale by Norasmah and Salmah (2011) as indicated by Ibrahim et. al (2015) as well.

4.1 LEVEL OF ATTITUDE TOWARDS ICT TOOLS

Table 1 consists of descriptive analysis which was conducted by extracting the mean value and interpreting those average values to answer research question 1. From the Table 1, it is clearly showing the entire mean score range from 4.00 to 5.00 which indicates that respondent's attitude towards ICT ranged in high level. Thus, it means that those TVET educators already been adopting ICT in TVET education are experiencing good comfort from the technology.

The finding from the Table 1 shows that the educators felt very comfortable to work with computers. The educators possess high self-confidence when it comes to work with the computers even though lack of training given ahead of this Pandemic Covid-19 crisis. From the response, educators were found enjoy teaching through online which also stimulates the learning process. The educators also do agree that knowing how to work with computers provides more opportunity to explore new areas and job competencies. Interestingly, the educators willing to learn new software to enhance their teaching. Overall findings display the attitude of educators toward ICT tools were high, means the educators willing to accept the usage of ICT to be implemented during the pandemic without much hesitation. The findings also show that ICT could end reach and creates a new teaching and

learning platform in TVET education.

4.2 LEVEL OF BARRIERS IN TECHNOLOGY INTEGRATION

Table 2 consists of descriptive analysis which was conducted by extracting the mean value and interpreting those average values by providing the dimension related to obstacles in detail. The result of this analysis will answer research question 2. It is clearly shown the entire mean score range from 3.00 to 4.00 which indicates that respondents were facing some moderate level of obstacles. The levels of obstacles in technology integration among the TVET educators is moderately high with mean score of 3.68. This score indicates that even though the adaptation possesses multiple challenges, the educators had embedded the ICT tools in the courses instructional strategies to adapt the practices in accordance to announcement made by Ministry of Higher Education regarding online teaching and learning, inclusive TVET program course delivery.

The educators encountered obstacles when they integrated ICT in the classroom. Trainings related obstacles and computer handling low self-efficacy are the main problems faced by the educators. Heavy teaching workload and supervision inhibits the opportunity for the ICT training. Meanwhile, some of the educators perceived low self-efficacy in mastering computer skills, which need to be addressed and resolved.

Table 2: Level of obstacles in technology integration among the TVET educators

Dimensions	Mean	Level
Time related obstacles	3.67	Moderately High
Training related obstacles	3.92	Moderately High
Equipment and assess related obstacles	3.25	Moderately High
Computer self-efficacy	3.87	Moderately High
Overall obstacles faced by educators	**3.68**	**Moderately High**

Table 3: Level of technology integration among the TVET educators

Dimensions	Mean	Level
Assigning daily or weekly computer related tasks	4.23	High
Using different software applications	4.12	High
Implementing newest software application	3.87	Moderately High
Receiving assistance from professional	3.76	Moderately High
Providing time allocation for students to practice their computer skills	4.56	High
Encouraging online interactive participation	4.12	High
Encouraging innovative learning from the ICT	3.69	Moderately High
Overall strategies	**4.05**	**High**

4.3 LEVEL OF TECHNOLOGY INTEGRATION STRATEGIES

Table 3 explains the extent to reach the educators employing strategies in the process of integrating ICT in school is concerned. The findings of the study indicated that educators employed search strategies to a moderate extent. Table 3 below includes the mean level of using integration strategies among the TVET educators.

The descriptive analysis above explains that the educators assigned daily or weekly computer related tasks that support curriculum. The educators provided short-term assignments using the classroom computers that emphasize the use of different software application such as spreadsheets, databases, Internet use, and multimedia. In addition, the educators also altered their instructional use of the classroom computers based on the newest software application and research on teaching, learning, and standard based curriculum. It was also found that the educator seeks the assistance from professionals, software applications and peripherals that maximize the usage of endless array of computers and technologies available to their learners. Besides that, the researcher allocated sufficient time for the learners to practice their computer skills on the classroom computers. Learners too in the classroom can participate in online interactive projects

with other departments for generating new ideas or brainstorming purposes. These matters will prepare them to engage effectively and confidently in online learning.

5.0 DISCUSSION

The findings from this study confirms with those previously conducted studies. Maddux and Cummings (2007) and Keengwe et. al. (2008) suggested that it is important to have enough number of computers to take specific computer applications and support educators. This study had also indicated the educators perceived positively classroom to be provided with computer devices for supporting the ICT tools adaptation in online learning. In fact, learners would be able to have their first-hand experience with computers and applications if each of them had opportunity to work with his or her own device at home. One point to highlight is that an adequate number of devices per class could increase the level of trainees' as well as trainers' engagement and familiarity with most recent updated technology of ICT and would increase the range of applications adapted in which the computer is integrated with the type of TVET courses.

Besides that, the level of stress can be tremendously

reduced when the educators and trainees are being trained prior to engagement in online learning. Formal, non-formal and inclusive trainings would benefit all stakeholders when scheduled accordingly as preventive measurement to be taken during Pandemic Covid-19 crisis, and also as future contingency plans in handling further crisis moments. Educators, trainees, TVET institutions, government, industry players and society as whole have to collaborate in handling the current tense situations during sudden implementation of online teaching and learning due to the current Conditional Movement Control Order which started to be adhered from 13th October 2020. Adequate, appropriate, updated infrastructures with sufficient financial assistance and guidance should be made available for educators and trainees to handle the transitions from conventional methods to and online delivery mode smoothly.

6.0 CONCLUSION

This study focuses on understanding the important role of educators in implementing ICT process during the Pandemic Covid-19 crisis. The finding shows that it is essential to prepare both the educators and learners for the anticipated integration of ICT in order to facilitate and avoid unexpected problems in handling the crisis. Incorporating technology into the curriculum is not a simple process in institutional level. It is such a complex process that looks forward to enhance leaners learning and realize curriculum goals through using the computer-based instructional methods. Among the main issues of implementing ICT in institutions are lack of financial support to install computer hardware, purchase education software or to train the educators.

The findings also showed that process of implementing technology in education is such a complex strategy with various obstacles especially when the educators are not trained on the necessary computer and teaching skills. Realizing the issues hindering the implementation of instructional technology, this study is expected to close the gap by investigating the potential barriers and strategies of implementing ICT during the pandemic period. It is finally concluded that training as one of the most important factors or strategy since most of the educators reported that they did not receive proper training. The findings are also able to assist stakeholders in serving the best for TVET trainees, and conduct further researches in addressing the challenges, rectifying and resolving all the issues. These matters will subsequently develop the skills and competencies set needed for 21st century employability opportunities, which are essential for future development of human capital and the nation.

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Introduction and Achievements of Industry-Academia Partnership Apprenticeship School in Korea

Seung Il Na [1]

Abstract The purpose of this article was to comprehensively review the introduction and achievements of the industry-academia partnership apprenticeship school, which has been introduced and operated in Korean specialized vocational high school since 2015. Apprenticeship schools have been promoted relatively successfully according to the original purpose and operational plan, and the achievements have been evaluated as positive and successful. In particular, apprenticeship schools could be regarded as a new vocational education model in that it could solve the lack of practicality in specialized vocational high schools and meet the needs of companies. The project cost is shared by both Ministry of Education and Ministry of Employment and Labor. One-third of all specialized vocational high schools are participating in apprenticeship schools, and only three of 67 project groups are based on the industry-led model, while the rest are based on the base school, single school, or joint practice center model. It could be seen that apprenticeship schools are school-centered rather than company-centered. Therefore, the apprenticeship school needs to be more industry field-oriented.

Keywords Apprenticeship, Specialized Vocational High School, 2015 Revised Curriculum, National Competency Standard (NCS), Dual System of Work and Learning

Introduction

Each country has long focused on vocational education and training in order to meet the demands of workforce in the industrial field. However, due to the lag in supply of workforce to meet the demands caused by the rapid development of industry and technology, there is a mismatch in workforce and skills (Na, 2019).

In particular, in line with the 4th Industrial Revolution and automation that has been spreading since the mid-2010s, it is urgent to improve job skills and develop vocational skills for job change for incumbents. In addition, as COVID 19, which has occurred since the beginning of this year spreads around the world, movement has been restricted which had led to a global economic downturn causing a decrease in jobs, an increase in the unemployment rate, making job search very difficult.

Efficiently cultivating the workforce required by the industry allows learning to meet the needs of the workplace. To this end, vocational high school education in Korea has been innovated in various ways. However, the satisfaction of employers and industries with the workforce being produced is still low.

Accordingly, in 2015, the curriculum was revised based on the NCS for vocational high school education (Raduan & Na, 2017). In addition, the so-called industry- academia partnership apprenticeship school

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(hereinafter referred to as apprenticeship school) was introduced by integrating schools and industries into the school-centered vocational education system. Apprenticeship schools are selected and operated as specialized vocational high schools. The curriculum of apprenticeship schools is characterized by jointly organized and operated by schools and industries. The purpose of the introduction of apprenticeship schools is to improve the field of vocational education by learning from school and business, and to resolve mismatches in employment and to promote youth employment (MOE, 2015).

In many countries, apprenticeship education tended to be relatively neglected compared to formal education, but there is a growing recognition that work-based learning such as apprenticeship facilitates the transition of work in schools and contributes to the economy. In fact, apprentices' training consist of a mix of time spent on the job site to perform productive work and competency development and off-the-job training, and in many cases apprentices spend more than 50% of their time on the job site (OECD, 2018).

The purpose of this paper was to review the introduction, operation, and outcomes of apprenticeship schools, which began as a new vocational high school education model in 2015, and to identify the problems and suggest improvement plans for sustainable development. The specific objectives were: First, the purpose of the apprenticeship school, its model, and the current status of its operation were reviewed. Second, the performance of apprenticeship schools was reviewed, and third, problems and improvement plans of apprenticeship

schools were presented.

This paper comprehensively collected and analyzed the background and operation plan of apprentice schools which had been announced by the Ministry of Education as a new form of vocational education, apprenticeship school selection and execution by project promotion year, monitoring and annual evaluation reports, and related research articles. In particular, the performance of apprenticeship school operation was synthesized based on the annual evaluation report conducted by the Ministry of Education as a service and the press release of the Ministry of Education. Therefore, although it was extracted and synthesized based on the evaluation report and news press release on the apprenticeship school project of the Ministry of Education, the author's subjective judgment cannot be completely excluded.

Developments of Vocational High Schools and Curriculum

Types and Status of Vocational High School

Currently operational vocational high schools in Korea are divided into specialized vocational high schools and Meister high schools in accordance to the revision of the Elementary and Secondary Education Act in June 2010. On the other hand, the types of high school are divided into general high school, special purpose high school, and specialized high school.

The number of specialized vocational high schools is 489, a decrease of 10 from 2010, and about 230,000 students are currently enrolled. Teachers are on the decline as the number of student decreases, with about 25,600 employees working in 2019. The employment rate of graduates was less than 20% in 2010, but increased to 50% in 2015, then decreased to about 31% in 2019, and is expected to decrease significantly due to Corona 19.

Meister high school is one of the special-purpose high schools. It is a school tailored to the needs of the industry. As of 2019, about 17,900 students had attended 47 schools, and about 2,800 teachers are employed. After graduation, the graduates is required to get a job first. The employment rate after graduation was 90% in 2015 and 88% in 2019 and the enrollment rate is on average 10%.

On the other hand, the comprehensive high school consisting of a vocational class (course) and a general class (course) has been classified as a general high school since June 2010.

2015 Revised Curriculum and Vocational

School Curriculum

In Korea, all elementary, middle and high schools must organize and obtain approval for school-level curriculum in accordance with the national curriculum and curriculum organization and operation guidelines of the provincial office of education. Specialized high schools and Meister high schools that provide vocational education are no exception, but have more discretion than elementary, middle, and general high schools. The currently applied national curriculum is the 『2015 Revised Curriculum』 revised in 2015. The human image that the 『2015 Revised Curriculum』 pursues is 'an independent person,' 'a creative person,' 'a person with culture', and 'a person living in harmony,' based on the ideology of 'Hong Ik' people(MOE, 2015).

The 2015 Revised Curriculum is called "NCS-based curriculum", which means curriculum for specialized vocational high schools and Meister high schools that provide vocational education. It is a curriculum organized based on the NCS according to the needs of the industrial site. National Competency Standards are standardized at the national level of competencies necessary to perform duties in the industrial field. It was introduced for the purpose of shifting the paradigm to competency-based education. It is intended to teach job specific skills as well as basic skills commonly required for workforce required in the field by using NCS. In this way, education, qualifications, and workplaces that were separate can be interconnected.

The high school curriculum organizes subjects (clusters) and creative experiences. Subjects are divided into general subjects and specialized subjects. The general subject areas consist of basic, inquiry, physical education and arts, life and liberal arts, and the corresponding subjects (groups) are Korean, mathematics, English, Korean history, society (including history/morality), science, physical education, art, technology and home/second foreign language/Chinese/culture.

Specialized subject is divided into I and II. Specialized subject I are subjects taught in science high schools and foreign language high schools, while Specialized Subject II are classified according to the classification system of NCS. Vocational high schools operate departments in consideration of the industrial demand and occupational changes, and curriculum is organized and operated in consideration of the types of workforces for each department, employment capacity and career development of students, etc. The school must organize at least 66 units of general subjects and at least 86 units of specialized subjects II out of 180 units of total completion units of the subject (group). When organizing a

practical subject, an operation plan for each grade and semester should be established based on the content area (competency unit) of the subject. Practical subjects are taught and learned in conformity with the achievement standards of the National Competency Standards. Creative experiential activities require a minimum of 24 units. The total unit of completion for graduation is 204 units, which must be completed for 3 years (NCIC, 2020).

Operational Plan and Models of Apprenticeship Schools

The apprenticeship school pilot project was carried out in 2015, and it had expanded operation to 60 schools in 2016, and in 2017, it expanded to all industrial vocational high schools, and plans to extend this to specialized vocational high schools in the future. The curriculum for apprenticeship schools is largely composed of theory and basic practice in schools and field education and training conducted in the industrial field. The field training is divided into practical training in companies and practical training at the apprenticeship training center. There are four models of apprenticeship school operation, which are classified into industry-led model, joint practice center model, base school model, and single school model. Students participating in the apprenticeship school go back and forth between schools and companies (apprenticeship training centers), and this occurs on either using daily regular, weekly, or period-based system. Students are selected in the second semester of the first year and they will participate in the second and third years for two years. School teachers are in charge of school education, while on-site education and training are handled by company field teachers, but school teachers also teach the participating teams if necessary.

Selection and Implementation of the Apprenticeship School

Progress and Selection of Apprenticeship School

In March 2015, nine specialized high schools conducted a pilot operation of an industry-academia integrated apprenticeship school (renamed). In 2015, 16 project groups and 51 specialized vocational high schools were selected as apprenticeship schools ('15.10.19). It was decided to expand from 60 schools to 200 schools in '16, but 99 schools were additionally selected by January 2017, and was decided to switch to apprenticeship school (4 schools, 12 courses) due to the suspension of recruitment for Unitech in '17('17.9). In October 2018,

the first project groups were reselected (8 schools), and in November 19, the second project groups were reselected (47 schools). Therefore, as of February 2020, 67 project groups, 182 courses and 162 schools are participating.

Application to become the apprenticeship school project in 2015 can select either to be a joint practice center, base school, or single school model, however in this year, the joint practice center and base school model were selected first (MOE & MOEL, 2015). ① Joint practice center model refers to three or more schools, more than 100 students, and more than 30 participating companies participate, and the provincial office of education (superintendent of education or joint practice center) applies jointly with participating schools as representative qualifications. ② Base school Model refers to one base school, two or more participating schools, more than 100 students, and more than 30 participating companies, and the base school applies jointly with participating schools as representative qualifications. ③ Single school Model refers to when there is at least 100 students, at least 30 companies must participate, and individual schools must send their application. Industrial fields suitable for apprenticeship education must be operable for qualification items or qualified occupations based on NCS based new qualification or national technical qualification. Specifically, ① as an important industrial field such as root industry, regional flagship industry, ② continuous workforce demand, ③ capable of developing to a higher level of technology through career development, and ④ presenting a vision for future growth to students and parents.

In the 2nd competition in 2016 (MOE & MOEL, 2016), there were four models of apprenticeship schools, but compared to the previous year, an industry-led model was added. The industry-led model is to establish apprentice education centers (joint training centers) in major industry organizations and representative companies, and are jointly used by schools and companies located nearby. The eligibility for application is having participants of 100 students or more and 30 companies or more. However, if a single company forms multiple schools and projects to participate, it is possible to apply if the number of participating students is 50 or more. The application method and operation are led by industrial complexes and organizations in each industry, and representative companies who apply for projects, develop and operate education and training programs, and operate the facilities. Major industrial organizations and representative companies are in charge of adjusting the education and training schedule of the apprentice education center (joint training center) and finding companies with

agreements, and each school is in charge of operating individual school curriculum.

The Ministry of Education and the Ministry of Employment and Labor (2016) jointly formed an evaluation team to conduct on-site inspections first, and the school are selected through written evaluation and presentation evaluation.

Budget and Allocation

The 2020's apprenticeship school support budget secured by the Ministry of Education (2020) is 25,410 million won, and this will be mainly used to support the operation of apprenticeship schools, but 5% will also be invested in finding companies to participate in apprenticeship schools and supporting the strengthening of apprenticeship schools' educational capabilities. The specific budget allocation is an additional 94 million won per apprentice school and 795,000 won per student. For additional subsidies according to the operating model, 6.5 million won per school is provided to the representative schools of the base school model and joint practice center model, and the industry-led model provides 2.5 million won per school as the association operating expenses. On the other hand, 2 million won and 1 million won will be additionally paid to grade S schools using the previous year's performance evaluation. On the other hand, the Ministry of Employment and Labor is also investing separately for apprenticeship schools as much as the Ministry of Education's budget each year.

Budget execution standards include operating expenses for specialty curriculum vacation programs and after-school programs, textbook development expenses, training expenses for school and participating companies, external cooperation support expenses, class replacement and auxiliary personnel expenses, purchase of equipment required for apprenticeship training, and training room remodeling expenses, and other reasonable expenses.

In the 2020 plan, the Ministry of Education (2020) will focus on supporting the operation of the curriculum of apprenticeship schools and developing and expanding the operation model, and is planning to promote it by focusing on improving the operation and finding and linking participating companies.

Achievements of the Apprenticeship School

The achievements of apprenticeship schools will be briefly reviewed based on the monitoring report of the apprentice school project mainly executed by KRIVET's apprentice school center, the survey report for performance analysis, and the internal document of the Ministry of Education's apprentice school performance.

In 2018, Ministry of Education, Chungcheongnamdo Office of Education, & KRIVET (2018 a; 2018b) conducted a survey to analyze the performance of the industry-academia partnership apprenticeship school. The main results are as follows.

1) Apprentice students' motivation to participate in apprenticeships is the same as the purpose of introducing apprenticeship schools, and they are satisfied that their apprenticeship education activities, OJT, job skills improvement, and relationship with classmates and teachers have changed positively. The average monthly wage is about 670,000 won. However, there was a lack of systematic connection between the educational content of the school and the content of the OJT, and the effective delivery ability of the company's field teachers was insufficient that an improvement was necessary.

2) Graduates obtained employment and financial help through apprenticeship schools, and are currently engaged in production jobs and are performing at a level similar to or higher than the level of apprenticeship education. Their job performance level is positive, their job satisfaction level is above average, and the company's satisfaction level is high. However, the level of organizational commitment was low, and the lowest level of satisfaction in apprenticeship education activities was the in-school education (Off-JT) (average 3.0). In addition, 41% of graduates would recommend participation in apprenticeship education, but one in five answered that they would not; while 3 out of 4 graduates had plans for future study.

3) Teachers tend to have high importance and satisfaction in improving students' ability to adapt to work and strengthening industry-academia cooperation between schools and companies. The level of implementation of industry-academic cooperation activities was perceived as above average, and the change in teacher competency was also recognized as very positive. About 88% of teachers were found to coordinate education time and content with company field teachers. However, one out of every three teachers needs team teaching with corporate field teachers for the entire course of the class, and about 58%

point out that 'discovering and managing participating companies' is the most difficult. They also pointed out the expansion of industry-led projects with various incentives support for participating companies.

4) The company field teachers expressed their motivation to participate in 'securing the talent required by the company' as a motive for participation, but by responding to the course of apprenticeship recognition through the school teacher, it is possible to realize that the discovery of participating companies was a difficulty for teachers. The first criterion for hiring apprentice graduates was 'company's job performance ability', but the first thing apprentice students expected to learn from school was 'vocational literacy such as personality', followed by 'company-specific job performance ability'. Satisfaction with the apprenticeship education system is on the high side, and the high level of satisfaction is 'vocational literacy such as personality,' and the next is 'company-specific job performance ability,' so both can be seen as important. They evaluated that the benefits of apprenticeship training for companies are that they can directly cultivate the necessary workforce and recruit accurate human resources through the apprenticeship training. In addition, more than half of them are willing to continue to participate in apprenticeship schools, but the biggest difficulty is the lack of practical training and customized education tailored to companies, and the development of programs.

In 2019, Ministry of Education, Chungcheongnamdo Office of Education, & KRIVET (2019) conducted a survey to analyze the performance of the industry-academia partnership apprenticeship school. In the survey in 2019, in comparison to 2018, graduates in '19 were additionally included, currently enrolled non-apprentice students were additionally surveyed, and non-participating teachers were added to participating teachers. The main results are as follows:

1) Students generally have a high level of satisfaction with apprenticeship education activities, corporate education, and corporate field teachers. Through apprenticeship education, it was surveyed that both class and life changes were positive. After participation in apprenticeship training, job competency improvement was also high. 70% of the students were willing to get a job in apprenticeship companies, and the rest did not consider getting a job because they consider going to college after graduation. The level of job understanding and career exploration competence of apprentice students was higher than that of general students, but there was no significant difference in self-understanding, sociality, career design and preparation. About 63% of the students answered that there was guidance from a school subject teacher when teaching in a company.

2) When graduates choose an apprenticeship company, this provides a possibility of technical improvement in their major field and the possibility of serving as an alternative to military service. In fact, an average of 87% are employed in companies that have completed apprenticeship education. The main reason for leaving a job at a company that has completed apprenticeship education is because of the distance from home or inconvenient transportation, accounting for one in four. In terms of wages, the number of graduates in 2017 was the highest at 21.48 million won per month, and it is gradually decreasing. For a successful career, 26.2% of graduates cited 'company-specific training', followed by an average of 24.8% of 'various major theory and practice education'. The proportion of graduates willing to recommend apprenticeship education averaged at 49.4%, which tended to increase by 3% every year. It turns out that 4 out of 10 are already learning afterwards, and 3 are planning to learn. As for the desired post-learning field, 70% of the majors were in the same field as the job of the company where they were employed. For 61% of graduates, the learning content of the NCS-based qualification was helpful in their actual job performance, especially in the order of compulsory competency units and company-specific units.

3) Although specialized teachers have a higher understanding of the apprenticeship school project than general teachers, the degree of agreement to participate in the apprenticeship school project, the effectiveness of the project, the need for an apprenticeship school project to provide quality education, and the apprentice school project for quality employment were perceived similarly high between the

two groups. In terms of the importance of apprenticeship education performance, specialized subject teachers perceived this to be the improvement of students' ability to adapt to the workplace, while general teachers perceived this to be the enhancement of the field ability of teacher competency. About 31% of the total respondents indicate that the important educational content for successful career life of apprentices is 'field experience training for practical understanding and adaptation of companies'. Specialized subject teachers emphasized 'vocational literacy such as personality', while general teachers were more likely to emphasize 'vocational basic skills education commonly applied to various occupations.' The side effects of the apprenticeship school operation were 'stiffness in academic management such as education timetable', followed by 'lack of time to run various educational activities', followed by discomfort among students and discomfort among faculty members.

4) In the survey in 2019, corporate field teachers were asked about apprenticeship participation motivation, apprenticeship awareness path, apprentice graduate recruitment criteria, apprentice education satisfaction, apprentice graduate satisfaction, apprenticeship ability improvement, apprentice participation effect, and intention to participate. They gave similar or positive responses to those in '18. The proportion of apprentice education graduates doing better than other high school graduates was somewhat higher as they have excellent corporate adaptability, and having good personality and integrity. Company field teachers had estimated that it takes an average of 2.6 years for an apprentice to become a beginner worker, an average of 4.0 years for an inexperienced worker to become an intermediate worker, and an average of 6.1 years for an intermediate worker to become an advanced worker for the career required for promotion in a company.

Meanwhile, the Ministry of Education (2020) presented three achievements of apprenticeship schools through internal documents.

First, apprenticeship schools are evaluated as a new secondary vocational education model. It is believed that the operation of a curriculum in which students learn from school and business is helping to improve the field of vocational education and resolve employment mismatches. The number of participating schools and students actually increased significantly, and the field of apprenticeship education was expanded to not only machinery (mold, cutting), but also electrical and electronic, chemical engineering, automobiles, IT, and services. And a variety of apprenticeship education models were developed through diversification such as a two-year course and a 1.5-year course.

Second, the employment rate and satisfaction are high. Students travel between schools and companies to receive on-the-job training to strengthen their competencies and were guaranteed stable employment after graduation. As of February 2019, the employment rate of apprentice school graduates was 70.3%, which exceeded the average employment rate for specialized vocational high schools. On the other hand, companies are evaluating that it is possible to save time and money due to mismatches in workforce supply and demand, as companies can secure excellent talent early and immediately deploy them to the site after hiring. 'The satisfaction level of the companies participating in the apprenticeship school in 2018 was confirmed to be above average with 3.7 points out of five.

The third achievement was the enactment of related laws, which laid the foundation for the establishment of the apprenticeship school system. The Act on Supporting the Dual System of Work and Learning in Industrial Sites was enacted ('19.8.), which ensured that the rights and interests of participating students are protected as learning workers, and the stability of apprenticeship education, such as granting a qualification for dual system of work and learning (National Qualification), is secured.

Conclusion and Recommendation

Apprenticeship schools have been promoted relatively successfully according to the original purpose and plan, and the achievements are evaluated as positive and successful. In particular, apprenticeship schools could be regarded as a new vocational education model in that it could solve the lack of practicality in specialized vocational high schools and meet the needs of companies. However, since the curriculum of the apprenticeship school is divided into schools, apprenticeship training centers, and companies, students need to be supported so that they are well connected and integrated from the perspective of students and show synergy as students learn from school and business. To do this, some reviews and appropriate actions will have to be taken. First of all, the interaction and reflection on learning in the school and in the field are to be entrusted to the students, so more

promotion measures should be prepared. Second, according to the 2015 Revised Curriculum, all vocational high schools use NCS to organize and operate field-oriented school curriculum. If so, there should be no difference between the apprenticeship school and the curriculum of the same school regardless of whether or not they participated in the apprenticeship school, even though they are the same department. It will be necessary to thoroughly review the curriculum because the difference between both curriculums is appropriate in consideration of the special needs and circumstances of the participating companies; but it may turn to be appropriate if it results in replacing essential content through high school vocational education. The base school model and the single school model are still school teachers or school-centered models compared to the rest of the models, so they have a lot of potential to be relatively weak in the field, so a close review should be made. It is also necessary to review whether apprenticeship school students' academic achievement is measured and evaluated and managed properly. This is because practical learning opportunities and actual achievements may differ even for students in the same department.

Based on these results, several suggestions can be made. First, apprenticeship schools can be successfully operated when they are attractive to both employers and apprentices. Policies for revitalization must be actively supported at the national level through interventions such as financial support, with long-term patience while taking into account the cost-benefit balance of both sides. Second, it is necessary to explore ways in which the theoretical learning in the school and practical learning in the field can exhibit a mutual synergy. Third, appropriate training opportunities should be given to corporate field teachers to cultivate the ability to run an effective apprentice school curriculum. Lee and Kim (2017) stated that corporate field teachers should be able to recognize, establish, implement, and evaluate apprentice education and be able to collaborate with vocational education institutions. Fourth, apprenticeship schools need to take measures to flexibly operate in the situation of COVID 19, and prepare for post COVID 19 and organize and operate a curriculum that can accommodate the fields required by the progress of the 4th industrial revolution. Lastly, the Korean apprenticeship school needs to be continuously developed as a successful model for the secondary vocational education, and it can be regarded as a remarkable case for our AASVET members and researchers.

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Analysis on the Development of Enterprise Curriculum in Modern Apprenticeship

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Abstract The difference between modern apprenticeship talent training and traditional talent training is that the enterprise side provides enterprise curriculum. The development of enterprise curriculum in modern apprenticeship is an important research issue. First of all, we should recognize the position of enterprise curriculum in modern apprenticeship: enterprise curriculum is an important part of the modern apprenticeship curriculum system, and the enterprise curriculum is the embodiment of the educational responsibility of the enterprise in the modern apprenticeship system， enterprise curriculum is the carrier of students' learning activities in modern apprenticeship. To further understand the form of enterprise curriculum in modern apprenticeship system, the main field of modern apprenticeship enterprise curriculum is enterprise workplace, and modern apprenticeship enterprise curriculum is not equal to practical training curriculums or internship curriculums. the forms of expression of modern apprenticeship enterprise curriculums are diversified. To promote the development of enterprise curriculum in the modern apprenticeship system, we need to adhere to the following strategies: formulate enterprise curriculum standards as the program of enterprise curriculum development, promote workplace learning throughout the process of enterprise curriculum development， and give full play to the cooperation between schools and enterprises to ensure the quality of enterprise curriculum development.

Keywords modern apprenticeship; enterprise curriculum; curriculum development; school-enterprise cooperation

Introduction

Modern apprenticeship is a school-enterprise cooperation talent training model. The important sign that distinguishes it from the traditional talent training model is that the enterprise side provides corporate curriculums. However, in practice, there are some problems, such as the formalization of apprenticeship in enterprise learning, the lack of enterprise learning plan, the misconnection between enterprise learning and school curriculum, and so on. These problems are closely related to enterprise curriculum development. In addition, there are some successful typical cases, such as the urban rail transit control major of Changchun Vocational and Technical College and the precision machinery technology major of Tianjin Modern Vocational and Technical College as modern apprenticeship pilot majors. a complete enterprise curriculum system has been developed, and a collaborative education pattern of "school curriculum + enterprise curriculum" has been formed. From the author's point of view, the breakthrough point of the modern apprenticeship talent training work is to grasp the enterprise curriculum development, and the problem of enterprise curriculum development urgently needs to be paid attention to. This paper attempts to discuss the orientation of enterprise curriculums in the modern

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apprenticeship system, the forms of expression and development strategies of enterprise curriculums.

1. The orientation of enterprise curriculum in modern apprenticeship system

1.1 Enterprise curriculum is an important part of the modern apprenticeship curriculum system

"If there were no curriculums, the modern apprenticeship system would be nominal and difficult to take root." The implementation Plan of Modern Apprenticeship pilot issued by the Ministry of Education in 2014 points out that promoting modern apprenticeship requires "schools and enterprises jointly build professional curriculums based on work content and professional curriculum system based on typical work processes". The complete curriculum system of modern apprenticeship system should include school curriculum and enterprise curriculum. If there is no enterprise curriculum, it is not a real modern apprenticeship system. "Modern apprenticeship is an enterprise-based vocational education system that studies based on work." At present, in some modern apprenticeship pilot majors in China, the development of enterprise curriculums is regarded as an important work, which is included in the modern apprenticeship talent training system, especially in the talent training program. In addition, there is also a mature enterprise curriculum system in the modern apprenticeship

system in Germany.

1.2 the enterprise curriculum is the embodiment of the educational responsibility of the enterprise in the modern apprenticeship system

The enterprise is one of the educational subjects of the modern apprenticeship system. The educational responsibility of the enterprise is to provide practical training venues, equipment, teachers, technical standards and employment posts for the training of modern apprenticeship talents. In fact, the above main responsibilities are closely around the work of training apprentices, so what is the carrier of training apprentices? What do you rely on to cultivate? In the final analysis, it is actually a curriculum, and the training venues, equipment, teachers and other aspects provided by enterprises can be summed up as enterprise curriculums. On the one hand, it helps the school to find out whether the school curriculum can be connected with the actual production of the enterprise; on the other hand, the enterprise develops the enterprise curriculum as the main body, and the enterprise curriculum is the concentrated embodiment of the educational subject responsibility of the enterprise in the modern apprenticeship system.

1.3 Enterprise curriculum is the carrier of students' learning activities in modern apprenticeship system

There are two places for vocational college students to learning, one is school, the other is enterprise. Curriculum is the carrier of students' learning activities, and curriculum is also the core of educational activities. There is no educational activity without curriculum. The two learning places of the modern apprenticeship mechanism provide corresponding two kinds of curriculums, the school provides the school curriculum, and the enterprise provides the enterprise curriculum. From the law of the growth of technical and skilled personnel, the acquisition of individual professional ability is a process of integration of theory and practice, work and learning. The development of ability does not rely solely on theory, but needs experience in the place of practice. "Vocational learning should take place in such a way, that is, to realize the comprehensive construction of knowledge on the basis of theoretical argumentation and practical experience insight." Enterprise curriculum is an indispensable carrier for the growth of technical talents.

From the above, the enterprise curriculum is in an important position in the personnel training of the modern apprenticeship system, and the effective promotion of the modern apprenticeship system must take the enterprise curriculum development as a breakthrough point.

2. Understanding of the form of enterprise curriculum in modern apprenticeship system

At present, there are some doubts in practice, such as: is the enterprise curriculum in the modern apprenticeship system an enterprise internship? Is it the internship practice in which the apprentice goes to the enterprise to participate? Is enterprise curriculum just to teach operational skills? Dose enterprise curriculum have nothing to do with theory? and so on. In view of the above doubts, the author thinks that the enterprise curriculum in the modern apprenticeship system is developed and implemented with the enterprise as the main body, that is, the curriculum developed by the enterprise side in the modern apprenticeship system, or based on the educational subject of the enterprise. or a curriculum that is mainly generated in an enterprise place. Specifically, we can have an in-depth understanding of the curriculum form of modern apprenticeship enterprises from the following aspects.

2.1 the main field in which modern apprenticeship enterprise curriculums exist is the enterprise workplace

Modern apprenticeship enterprise curriculum is essentially a workplace-based learning system, is a workplace curriculum, mainly exists in the workplace, and is closely related to things in the workplace. Does the enterprise curriculum only exist in the enterprise site? Corporate curriculums mainly exist in enterprises, but they can also exist in schools. In other words, the vast majority of corporate curriculums exist in enterprises, while only a small number of them exist in schools. Therefore, in the overall personnel training of the modern apprenticeship system, some enterprise curriculums are in the work site of the enterprise, facing the production line of the enterprise, and the enterprise master leads the apprentice to study in the workplace. There are also a small number of enterprise curriculums, although they are not carried out at the enterprise work site, but they are sent by the enterprise master to the campus and are the curriculums provided by the enterprise. This part of the curriculum may not need to be intuitive on the spot. You only need the master to give a simple explanation and guidance in the school.

2.2 Modern apprenticeship enterprise curriculums are not the same as practical

training curriculums or internship curriculums

Enterprise curriculums are not equal to practical training curriculums or internship curriculums, and the connotation of enterprise curriculums is much richer than that of practical training curriculums or internship curriculums. The single basic skills training curriculum carried out in the school training room is not an enterprise curriculum, although the equipment used in the school training room may be provided by the enterprise, but because this training does not take place in the enterprise at all, but only as a practical part of the school curriculum. In the school teaching link, the non-productive training or practice training that the school teachers take the students to the enterprise is not necessarily an enterprise curriculum, although this practice training takes place in the enterprise and uses the teaching equipment provided by the enterprise, but the teaching plan is designed by the school and belongs to a practical teaching link in the school curriculum plan, so this is not an enterprise curriculum. In some modern apprenticeship pilot majors, is the post internship an enterprise curriculum? Perhaps most of them belong to school-enterprise cooperative curriculums, rather than pure corporate curriculums, because many cases lack educational standards and plans based on corporate positions, and most cases are a laissez-faire job practice, lack of the essence of "curriculum".

2.3 diversification of forms of expression of modern apprenticeship enterprise curriculums

Modern apprenticeship enterprise curriculum has a certain complexity and diversified forms of expression. According to the possible development direction for apprentices, enterprise curriculum can be divided into cognitive curriculum, skill curriculum and cultural curriculum. Some corporate curriculums provide apprentices with job awareness, some corporate curriculums provide apprentices with job skills, and some corporate curriculums mainly provide students with cultural edification of spirit and values. According to the main types of ways adopted by apprentices in the study of enterprise curriculums, enterprise curriculums can be represented as sensory curriculums, operational curriculums and symbolic curriculums. Some enterprise curriculums only need apprentices to use sensory perception, some enterprise curriculums need apprentices to use specific actions to do, and some enterprise curriculums need apprentices to use verbal ideas to absorb, digest or express. According to the obvious and recessive nature of the curriculum, the enterprise curriculum can be represented as the explicit enterprise curriculum and the recessive enterprise curriculum. Explicit enterprise curriculums are curriculums that directly and consciously perceive participation, such as the direct use of equipment to operate; hidden enterprise curriculums are apprentices who are not aware of it and are not directly included in the formal curriculum plan. however, it has an imperceptible influence on the development of apprentices, such as corporate culture, corporate interpersonal relationships, corporate material environment and so on. In addition, the enterprise curriculum has both practice and theory, and the enterprise curriculum in the German apprenticeship system mainly includes four parts: vocational foundation, vocational major, social project and enterprise rotation internship, mainly based on practical learning. but it will also include the study of theoretical knowledge necessary to complete practice.

3. The enterprise curriculum development strategy in the modern apprenticeship system

3.1 to formulate enterprise curriculum standards as a program for enterprise curriculum development

In the survey, it is found that "the lack of standardized standards to guide the enterprises curriculum development of modern apprenticeship " is the biggest confusion faced by enterprises. There is an urgent need to teach the committee, the bank committee, the technical backbone of enterprises and other forces to work together to develop enterprise curriculum standards to provide standards and guidelines for enterprise curriculum development. Taking the German apprenticeship system as an example, trade associations and other forces have formulated "Vocational training regulations" specifically for enterprise curriculums, which defines the enterprise framework teaching plan and the implementation plan of enterprise teaching. Each vocational training regulation stipulates the name of the enterprise training occupation, the duration of the training, the content of the training, the training syllabus and the examination requirements; and an important part of the Vocational training regulations is the Enterprise Teaching Framework Plan, which is essentially an outline for apprentices to receive education or study in enterprises. These essentially constitute the enterprise curriculum standards. As a programmatic document of the curriculum, curriculum standards are the basic norms and quality requirements of the curriculum and the guiding document of

curriculum teaching. Curriculum standards mainly include the provisions of curriculum nature and task, core literacy and curriculum objectives, curriculum content, curriculum implementation and curriculum evaluation. The development of modern apprenticeship enterprise curriculum standards should be based on the orientation of professional training objectives, apprenticeship workplace learning rules and talent training programs, and determine the nature and tasks of enterprise curriculums with reference to professional standards and enterprise job demands. make clear the core literacy and development goals that students want to achieve; choose the contents of enterprise curriculums according to the tasks and curriculum objectives of enterprises, and design the organizational structure of enterprise curriculums. The construction of practice-oriented enterprise curriculum implementation suggestions; the establishment of developmental curriculum learning quality standards.

3.2 Promoting workplace learning throughout the process of enterprise curriculum development

For the construction of modern apprenticeship enterprise curriculum, we should first give it a reasonable positioning and concept guidance in theory. Workplace learning theory is the theoretical basis of modern apprenticeship enterprise curriculum construction, which is essentially a workplace learning system. Under the guidance of workplace learning theory, we should reasonably organize the content of enterprise courses in modern apprenticeship. At the same time, we should design teaching step by step according to the learning process, and finally promote the standardization of apprenticeship workplace learning in modern apprenticeship. Under the guidance of workplace learning theory, we can understand the orientation of modern apprenticeship enterprise curriculum in an all-round way. It is a learning system based on workplace, which ultimately points to students' comprehensive vocational ability learning, rather than limited to practice or practice. Modern apprenticeship enterprise curriculum is not equal to practice course or practice link. Modern apprenticeship enterprise curriculum is not limited to practice, but contains the educational elements of theoretical principles. The modern apprenticeship enterprise curriculum is not the traditional enterprise practice. The traditional enterprise practice is actually a practical application based on the school theory learning, while the modern apprenticeship enterprise course is a comprehensive learning based on the enterprise workplace.

Curriculum development is an overall operation process of curriculum system elements, which specifically involves curriculum goal determination, curriculum content design, curriculum implementation planning and curriculum evaluation operation. "Workplace learning theory is the theoretical basis of modern apprenticeship enterprise curriculum construction, and modern apprenticeship enterprise curriculum is essentially a kind of workplace learning system." The modern apprenticeship enterprise curriculum aims to promote the workplace learning of apprentices. Then, the concept of workplace learning should always be carried out in the process of enterprise curriculum development. First of all, about the determination of enterprise curriculum objectives. The determination of enterprise curriculum objectives should be based on the analysis of professional competency requirements in the enterprise workplace. Specifically, this kind of professional competence can be expressed as professional norm knowledge, the ability of work situation to transfer knowledge and personalized practical wisdom. The knowledge of professional norms is mainly the knowledge needed to express professional rules, professional objects, professional environment and so on in the professional positions corresponding to enterprise curriculums. the ability to transfer knowledge in a work situation is an ability to respond appropriately to tasks and activities in a specific work situation. Personalized practical wisdom is a kind of practical wisdom with individual preference to deal with work problems, which is formed on the basis of professional norm knowledge and the ability of work situation to transfer knowledge. Secondly. With regard to the content design of enterprise curriculums, we need to do a good job in content selection and organization. The main source of enterprise curriculum content selection is the experience system in the enterprise workplace. According to Stephen (Stephen Billett) of Australia ,The content of enterprise curriculums comes from workplace knowledge, which can be divided into three aspects: conceptual knowledge (Conceptual knowledge), procedural knowledge (Procedural knowledge) and orientation knowledge (Dispositions knowledge). The organization of enterprise curriculum content is mainly to realize the serialization or structure of the curriculum, which can be arranged according to the difficulty or complexity of tasks in the workplace, or according to the stage of professional ability growth and development. Third, about the enterprise curriculum implementation, it is actually a working process, which integrates into the enterprise work process, leads the curriculum implementation by the real work tasks in the enterprise, and focuses on the interaction between the enterprise master and the apprentice in the workplace. it can be embodied in practical forms such as demonstration, observation,

communication, attempt, reflection and so on. Fourth, with regard to enterprise curriculum evaluation, workplace-based expressive tasks should be designed to examine the learning effect of apprentices.

3.3 Give full play to the cooperative efforts of schools and enterprises to ensure the quality of curriculum development in enterprises

From the point of view of the name, although the modern apprenticeship enterprise curriculum is an "enterprise" constrained curriculum, it does not seem to have much to do with the school, but in fact it still needs to do a good job of coordination between the school and the enterprise. On the one hand, the enterprise curriculum is not isolated, but should be placed in the overall system of modern apprenticeship professional training, and it should be coordinated with the school curriculum. Respectively find the positioning of corporate curriculum and school curriculum, the two complementary advantages of collaborative education. On the other hand, as a carrier of talent training, enterprise curriculum is educational and should give full play to it, while enterprise masters or relevant forces often do not understand the inherent law of education. As far as the organization of enterprise curriculum content is concerned, enterprises need to learn more about the logical and sequential design methods of school curriculum content. As far as the teaching methods of enterprise curriculums are concerned, enterprise teachers may need to learn more about the teaching skills and skills of school teachers. Enterprises should make good use of workplace learning theory and other relevant educational theories, organize the contents of enterprise curriculums in modern apprenticeship system reasonably, and design teaching in a planned and step-by-step manner according to the learning process, so as to promote the standardization of workplace learning in modern apprenticeship secondary schools.

3.4 Give full play to the main role of enterprise master in the course construction of modern apprenticeship enterprise

The enterprise master, like the school teacher, is the creator and implementer of enterprise curriculum. According to the five-level curriculum theory put forward by American scholar j. i. good lad, the ideal curriculum -- formal curriculum -- comprehensible Curriculum -- operational curriculum -- experiential curriculum. These five levels of curriculum is a gradual change process, from the ideal curriculum in the minds of experts or the public, through official legal recognition and scientific screening, to formal curriculum, from the formal curriculum to the comprehensible curriculum understood in the teacher's brain, from the comprehensible curriculum understood by the teacher to the curriculum operated in the classroom, and finally the experiential curriculum constructed in the students' brain after the class. In the process of this transformation, teachers understand the formal curriculum, teachers bring the curriculum into the classroom, and finally pass it to students. Teachers play an important role, which shows that teachers play an important role in the operation of the curriculum. Similarly, from the ideal enterprise curriculum to the formal Enterprise curriculum, to the comprehensible enterprise curriculum, to the operational enterprise curriculum, and finally to the experienced enterprise curriculum, the enterprise master is of great significance in this process, and is the main body of the enterprise curriculum. In fact, it requires the enterprise master to have a certain curriculum awareness and ability. The so-called curriculum consciousness of enterprise masters refers to their sensitivity to the curriculum, their understanding of the curriculum system, and their conscious use of curriculum thinking to examine and standardize their own process of educating apprentices. The so-called enterprise master's curriculum ability refers to the ability of enterprise curriculum target design, enterprise curriculum content selection, enterprise curriculum implementation and enterprise curriculum evaluation. In the training of modern apprenticeship talents, it is necessary to train the enterprise masters on curriculum and teaching theory, strengthen their knowledge of curriculum and teaching theory, and enhance their ability of curriculum development.

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The Effectiveness of Learning Model of Vocational Competency Electronic Level Industry Based Problem Solving

Purnamawati[1], Muhammad Yahya[2]

Abstract This study aims to find out: (1) description of problem solving learning activities with 4 (four) stages, namely: recognizing problems, selecting techniques / solution plans, determining solving strategies, and recommending the results of solutions. (2) the response of students to the problem solving based Industrial Vocational Competency (DKK) learning model, (3) differences in learning outcomes of Industrial Electronics expertise in Electrical and Electronics Basic MAPEL, and (4) the effectiveness of the Electronic Expertise DKK learning model Problem solving based industry. This type of research is quasi-experimental research. The study design used Pretest-Posttest Control Design with 66 research subjects divided into 2 classes, namely the control and experimental class of 33 people. The data collecting technique is derived from response questionnaires and student learning outcomes tests. Data were analyzed using descriptive and inferential statistics with Independent Sample T Test analysis. The results showed that: (1) The description of problem solving learning was carried out well with systematic steps, (2) the response of the experimental class students was higher than the control class, (3) the learning outcomes of the experimental class students were higher than the control class, and (4) the problem solving industry electronics expertise learning models effectively used in learning.

1. Introduction

The vocational high school revitalization program as mandated in presidential decree No. 9, 2016 has four main points [1]. The four points consist of curriculum revitalization, teacher and staff, collaboration, and alumni. Revitalization expected to respond the quality of vocational high school alumni with business and industrial world. The alumni who are compatible, multi-skilling, critical thinking, creative, problem solving, innovative are the part of the 21st century competencies needed in the world of work. 21st Century Partnership Learning Framework" those are: critical-thinking and problem-solving skills; communication and collaboration skills; creativity and innovation skills; information and communications technology literacy; contextual learning skills; information and media literacy skills [2]. The qualified alumni and learning quality are linearly related. The improvement of learning quality affects alumni competences. The teacher making learning innovation will be able to achieve quality learning goals according to learning in the 21st century and industry 4.0. Thus, the competency of Vocational High Schools

graduates is expected to be in accordance with the needs of the business world and industry, so that there is no gap between the competencies possessed and the needs of the workforce.

Vocational competency of industry electronics major problem solving based learning model aims for individualizing students. Students trained for using cognitive skill in arranging the solving steps by problems given by teacher. Learning is designed systematically with patterns to identify problems, find ways to solve, find solutions, and provide recommendations. [3] explains the analysis of the problem solving process itself is related to the ability to perceive the problem, the perceptibility of the problem, the willingness to solve the problem, the awareness of existence of the problem or strategies of problem solving. This is not only in the field of psychology but also in the field of pedagogy, or education.

The [4] identified three main problem based learning requirements, learning by doing, learning in context, and focusing on the student. Problem based consist of four main phase [5]: (1) Understanding the problem; (2) Design a plan; (3) do the plan, and (4) re-open and re-check. Applying problem-solving strategy, at least these following factors have to be considered: (1) Knowledge; (2) Algorithm; (3) Heuristic; (4) Mechanism decision; and (5) Reflection. This problem solving steps are used for planting the students cognitive. The process in problem solving involving thinking ability which is enhanced by teacher. Teacher role provides problem solving process by helping students with explaining the problem,

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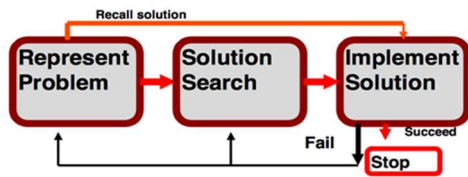
Figure 1. A model of the problem solving process [9]

Figure 2. M4PS Stages Solving problems in learning

improving solving steps, finding sources and not giving a solution [6].

Adapting Problem Based Learning (PBL) as teaching approach, will help learners to develop the ability to arrive at informed judgments by effectively defining problems, gathering and evaluating information related to those problems, and developing solutions; the ability to function in a global community; adaptability; ease with diversity; motivation and persistence (for example being a self-starter); ethical and civil behavior ; creativity and resourcefulness; technical competence; and the ability to work with others, especially in team settings [7]. The findings of this study will provide a general guideline for educators in Technical and Vocational Education and Training (TVET) institutions in implementing Problem-Based Learning (PBL) at Diploma level of the students [8]. [9] identifies the basic model of 3 (three) cognitive activities in problem solving, namely: (1) Problem Representation, Search Solutions, end (3) Implement Solutions described as follows.

Figure 1. illustrates the represent problems related to regulation and identifies goals related to the initial conditions for the problem. Solution search includes improving the asset development plan to achieve the goal, and implementing the solution including executing the action plan and evaluating the results.

The [10] divides into 4 (four) steps of problem solving in learning, namely: (1) Understand the problem, (2) Devise a plan, (3) Carry out your plan, and (4) Look Back to examine the solution obtained. [11] was giving IDEAL synonyms (Identify the problem, Define the context of the problem, explore possible strategies, Act on the best solution, Look back and learn. The stages of problem solving developed by experts are recommendations to be implemented in the learning of MAPEL (Subjects) for Electricity and Electronics in Vocational High Schools. The problem solving stages in this study summarize several problem solving development models from experts, which are then simplified into 4 (four) problem solving stages as follows: (1) Identifying the problem. (2) Selecting a technique / plan for solving, (3) Determining the solving strategy, and (4)
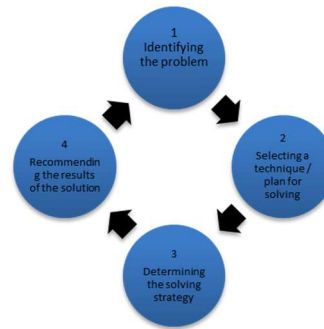
Recommending the results of the solution, this stage is given the name M4PS.

The Vocational competency of industry electronics in problem based learning conducted in practicum learning; learning process involving complex activity not only transfer of knowledge from teacher to students contextually. However, every lesson should make student comprehend the proclaimed competences, including the values and attitude. Hence, besides on class, learning process is able to conduct in laboratory also. Laboratory learning process has activities providing experimental design, operation, and data interpreting, causing balance of science acquisition skill and attitude [12]. Thus, by laboratory learning process activity, students will optimally comprehend working skill [13].

The problem solving learning model uses the stages in Figure 2. which consist of 4 (four) stages.

Figure 2, completing the flow of the M4PS stages of problem solving in learning that begins with stages (1) overcoming the problem, this stage overcomes the sorting of problems based on the level of difficulty. (2) choosing a technique/plan for enumeration, activities carried out by selecting the appropriate technique /plan based on the problem that has been recognized/understood. (3) determine the solution strategy, choose the right strategy in finding solutions to the problems reported in the previous step. (4) recommend the results of the solution, find final conclusions that can be recommended based on problem solving obtained. The flow in Figure 2 is the stage used to find a solution through problem solving.

Thus problem solving based on learning is cognitive learning strategy where some students receive systematic instructions and analysis it then giving solutions to problems of DKK ("Dasar Kompetensi Kejuruan" the stands word of DKK in Indonesian language) in the industrial Electronics field of Expertise of MAPEL ("Mata
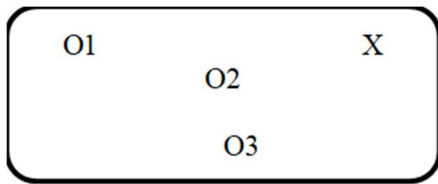
Figure 3. Design of quasi-experimental research with two groups

Pelajaran" the stands word of MAPEL in Indonesian language) Basic Electricity and Electronics. DKK is the basic technical competence that must be mastered by the student, then MAPEL is the subject or the name of practicum subject. Hence, the study about problem solving based learning needed for helping students understand vocational competency also, guiding students to find solution by themselves and resulting a fit solution.

2. Research Methods

This study is quasi experiment, having control class that is unable to control all influencing external variables [14]. The study was conducted at SMK Negeri 2 Makassar on industrial electronics expertise competency in electricity basic and electronics MAPEL in class X in the 2017/2018 academic year. It consists 66 students from two classes, control and experiment class. The data was analyzed by using descriptive and inferential statistics. The research design is as follows.

3. Results and Discussion

3.1 Study result description

3.1.1 Stages of problem solving in learning MAPEL Basic Electricity and Electronics

Stages of problem solving in learning MAPEL Basic Electricity and Electronics with M4SP is explained in Table 1. The systematic implementation path begins with identifying the problem. For this stage, Basic Competence (KD) is about analysing the properties and rules of series, parallel, and mixed circuits. The teacher divides the problem based on the series analysed by each group member. Then each student analyses the KD problem by remaining patterned in the sequence of stages of problem solving. The activity description of the students begins with recognizing the problem until it can recommend the results of the solutions made in the experimental class as follows.

Based on Table 1. Students have done well stages 1 through stage 4 of M4PS, with an average of 93.18%.

Table 1. Description of the stages of learning MAPEL Basic Electricity

and Electronics for the experimental class

| No.	Stages of problem solving	Activity description	Freq.	%
1	Identifying the problem	Students recognize the theme of the problem and then discuss with their group friends	32	96,97
2	Selecting a technique / plan for solving	Students choose several techniques that are appropriate to the theme of the problem and make a flow of problem solving	31	93,94
3	Determining the solving strategy	Selection of several alternative strategies	30	90,91
4	Recommending the results of the solution	Make a resume based on the results of the solutions obtained, then present and recommend	30	90,91
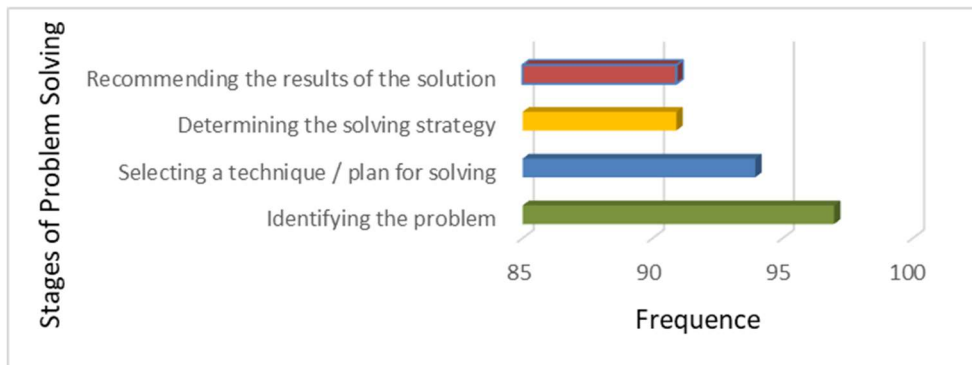
Figure 4. Histogram of the stages of learning MAPEL Basic Electricity
and Electronics for the experimental class

Table 2. Description of the stages of learning MAPEL Basic Electricity

and electronics for control class

No.	Conventional Learning Stages	Activity description	Freq	%
1	See the problem	Learners do the solution by looking at the problem and immediately find the answer	22	66,67
2	Looking for a solution	Students develop problems with simple techniques to solve problems	22	66,67
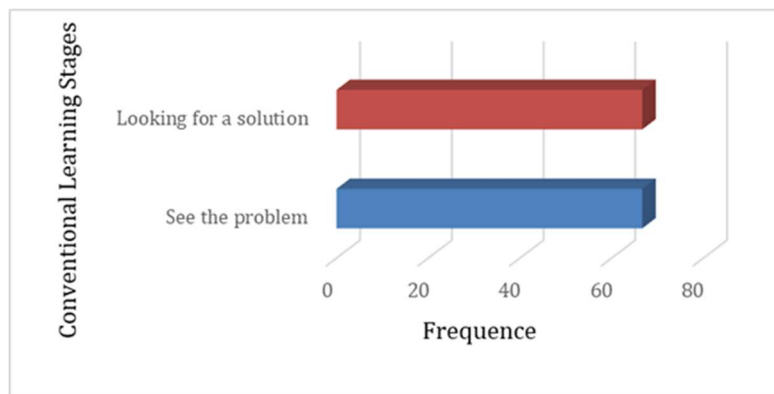
Figure 5. Histogram of the stages of learning MAPEL Basic Electricity
and Electronics for control class

Furthermore, it is described in the histogram as follows and supported by experimental class learning results in Table 3.

Data from the control class analysis by providing learning in which students complete their own way with teacher instruction directly, the results of the participants
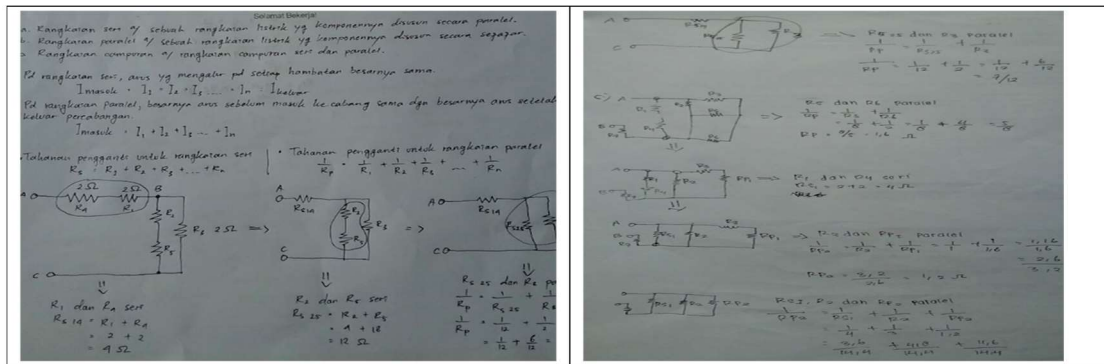
（1）Learning outcomes of students from the experimental class
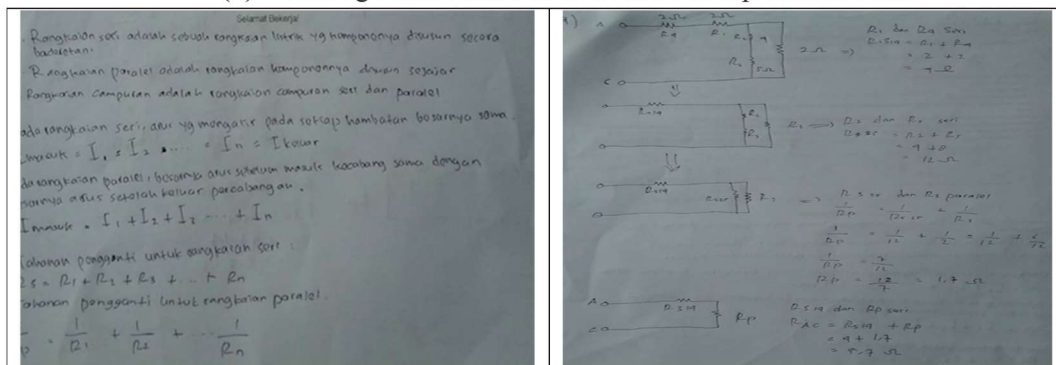
Learning outcomes of students from the control class

Figure 6. (1) Learning outcomes of students from the experimental class, (2) Learning outcomes of students from the control class

Table 3. Frequency distribution and student respond score category

Category	Experiment class		Control class	
	Freq.	%	Freq.	%
Very high	3	9	0	0
High	17	52	0	0
Medium	13	39	22	67
Low	0	0	10	30
Very low	0	0	1	3
Sum	33	100	33	100

have not been able to solve the problem correctly, only with a percentage of 66.67% in KD about analysing the nature and rules of series, parallel, and mixed. This can be seen in the learning outcomes in Table 2 and completed with Table 3.

Some learning outcomes from the KD experimental class are about analysing the properties and rules of series, parallel, and mixed circuits. The experimental class
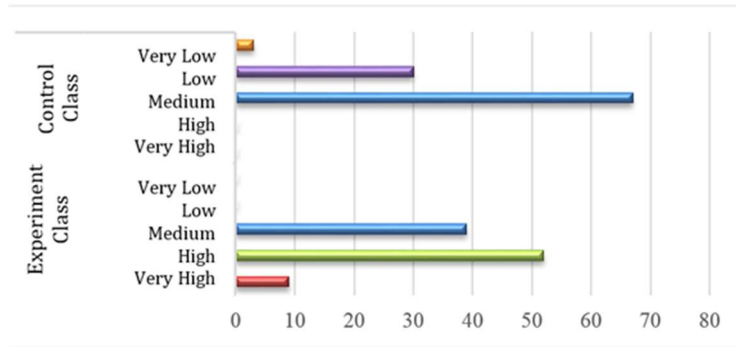
Figure 7. Trend of student respond

Table 4. The student activity frequency distribution and students' activity category

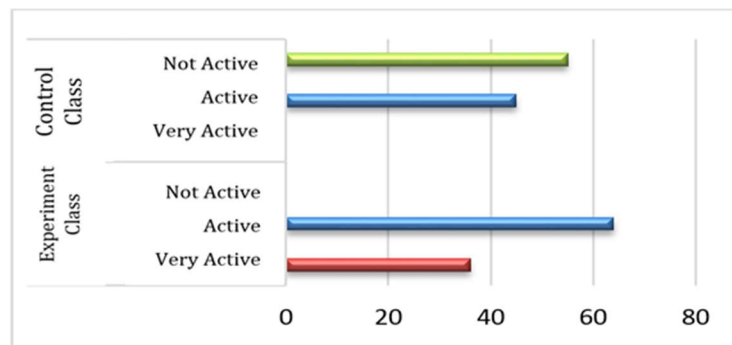| c	Experiment Class		Control Class	
	Freq.	%	Freq.	%
Very Active	12	36	0	0
Active	21	64	15	45
Less Active	0	0	18	55
Sum	33	100	33	100

Figure 8. The trend of student activity

learning outcomes differ from the control class in describing learning test questions. The experimental group provides an answer solution in a systematic way and the correct method, while the control group does the task based on its understanding, not patterned in critical thinking. The control group works according to a known formula based on its understanding of the material.

Points (1) and (2) are the learning outcomes of students in working on the problem with the same KD.

3.1.2 Student learning respond data

Students' respond towards the applying of problem solving based learning is obtained from student respond mean score. The mean score of control and experiment

Table 5. The frequency distribution and learning outcome category

Category	Experiment Class				Control Class			
	Pre-test		Post-test		Pre-test		Post-test	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Very Good	0	0	15	45	0	0	1	3
Good	0	0	17	52	0	0	17	52
Fair	0	0	1	3	0	0	14	42
Poor	33	100	0	0	33	100	1	3
Sum	33	100	33	100	33	100	33	100
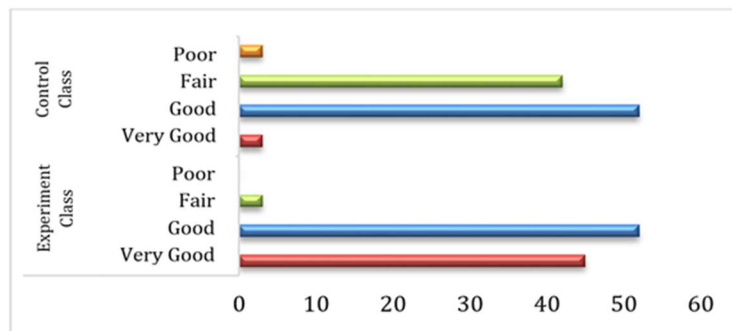
Figure 9. Trend of learning outcome

Table 6. The Distribution of Student learning outcome completeness

on electricity and electrical subject

Score	Category	Experiment Class		Control Class	
		Freq.	%	Freq.	%
75 – 100	Pass	31	94	15	45
0 -74	Not pass	2	6	18	55
	Sum	33	100	33	100

class are 66,36 and 87,88 respectively. The frequency distribution and student respond score category are shown on Table 3.

Table 3 shows the student respond from experiment class are in very high, high, and medium category. Meanwhile, control class are in medium, low, and very low category. The control class has no one reached high category. Figure 7. presents the trend of experiment and control class mean score.

Table 7. Student respond hypothesis test result

α	Class	N	Mean	t	t Table	Sig.
0,05	Experiment	33	87.18	7.624	2.036	0,000
	Control	33	66.36			

Table 8. The Student activity hypothesis test result

α	Class	N	Mean	t	t Table	Sig.
0,05	Experiment	33	78.00	12,608	2,036	0,000
	Control	33	56.88			

Table 9.   Pre-test hypothesis test result

α	Class	N	Mean	t	t Table	Sig.
0,05	Experiment	33	43,94	0,792	2,036	0,431
	Control	33	42,33			

Table 10. Post-test hypothesis test result

α	Class	N	Mean	t	t Table	Sig.
0,05	Experiment	33	72,42	6,356	2,036	0,000
	Control	33	84,76			

3.1.3 Student learning activity data

The student learning activity mean scores of experiment and control class are 78,00 and 56,88 respectively. The frequency distribution and category of student activity are presented in Table 4.

In Table 4, the student activity of experiment class are on very active and active category, meanwhile, the control class are on active and less active category. The trend of experiment and control class student activity is shown in figure 8.

3.1.4 Student learning outcome data

Based on the data analyst, there is a difference between control and experiment class. The pre-test mean of experiment and control class are 42,33 and 43,94 respectively. The pos-ttest mean of experiment and control class are 84,76 and 72,42 respectively. The data presents experiment class mean score is higher than control class. The frequency distribution and student learning out come category are shown in Table 5.

Table 5. presents the both classes improvement. Both experiment, and control class pre-test score distribution are on poor category. Hence, experiment, and control class have same initial knowledge on electricity and electrical subject.

Figure 9. presents the trend of learning outcome on experiment and control class. The data indicates that the learning outcome after implementing problem solving based learning is significantly increase.

3.1.5 The Effectiveness of applying problem solving based learning

The evaluation of student learning completeness is obtained from post-test. Student learning completeness based on school minimum mastery criteria. The data analysing result of student learning completeness compared to 75 (school minimum mastery criteria) shown in Table 6.

Table 6. shows that 2 or 6% of experiment class students are not pass, while for control class 18 or 55% students. Both experiment and control class improved respectively from 0% to 94% and 0% to 45% in post-test. Hence, it concluded that student learning outcome in experiment class is higher than in control class.

3.2 Inferential analysis

Normality test of the instrument used Kolmogorov-Smirnov test with significance $> \alpha = 0,05$. In experiment class, the significance value of Student respond is 0,076, student activity is, 0,095, students' learning outcome is for pre-test 0,071 and for post-test 0,057. In control class the significance value of student respond is 0.119, student activity is 0,200, students' learning outcome is for pre-test 0,083 and for post-test 0,052. Thus, the population of experiment and control class are normal.

The homogeneity test obtains the significance value of student respond is 0,052, student activity is 0,395, and students' learning outcome is for pre-test 0,074, and post-test 0,090. Thus, the experiment and control class data are homogenous since significance $> \alpha = 0,05$.

3.2.1 Hypothesis test

3.2.1.1 Student respond hypothesis test result

The t-test of student respond questionnaire is shown on Table 7. The t is 7,624 with significance 0,000. Significance shows $0,000 < 0,05$. The student responds mean score of experiment class is higher than control class 75,20 and 43,24 for each.

The result shows there is an improvement in experiment and control class student respond on industry electronics major on electricity and electronics basic subject.

3.2.1.2 Student activity hypothesis test result

The t-test of student activity questionnaire is shown on Table 8. The t is 12,608 with significance 0,000. Significant shows $0,000 < 0,05$. The student activity mean score of experiment class is higher than control class 78,00 and 56,88 for each.

The result shows that there is an improvement in student activity of experiment and class control on electricity and electronics basic subject.

3.2.1.3 Student learning outcome hypothesis test result

Since, the data is normal and homogeneous, t-test is conducted on pre-test to find the initial knowledge of experiment and class control. The t-test result showed that Sig. (2-tailed) $0,431 > 0,05$. Thus, the initial knowledge of experiment and control class are same.

Based on t-test result, the significance of learning outcome after receiving different treatment is 0,000.

Table 10. presents alternative hypothesis is accepted Since $0,000 < 0,05$. It concluded that there is a difference on student learning outcome which are taught by problem solving based learning. The result shows that the implementation of problem solving based is effective increasing student learning outcome in MAPEL Basic Electricity and Electronics.

3.3 Discussion

The implementation of Problem solving based learning model gives student a chance to experience realistic learning, know how to solve problems, and decide a decision. The implementation purposes are to train students to think, solve problems and find fit solutions. The learning model starts from giving a material and initial knowledge, then, Students perform activity such as observation, question, identification, and formulating theorem to complete the given task. This learning model will improve student critical thinking skill.

The result of the implementation of problem solving based learning are students are active to find information, work together and enrich their knowledge to help them solving problems. The student activity divided by very active, active and less active category. The distribution of the value of learning activities of students for the control class and experimental class is in the category of less active, active and very active. The conclusion, student activity taught by problem solving based learning is active.

The student involvement in learning model is one of the effectiveness indicators. Students are not only receiving material from teacher but also enhancing their social skill. The learning model trains students working together, giving motivation, increasing chances to share knowledge, discussion, and improving thinking skills. So that the learning outcomes of students in the experimental class are higher than the control class. Hence, experiment class is higher than control class.

The difference of category distribution of learning outcome are taught by problem solving based learning

are on very good, good, fair, and poor category. Based on t-test result, showed that experiment class learning outcome is significant, hence, state that problem solving based learning improves student learning outcome on electricity and electronics basic subject. The learning outcome mean score of student are taught by problem solving based learning is good.

Student completeness on every subject based on school minimum mastery criteria. Minimum master criteria score is 75 and using curriculum 2013. Before learning, pre-test conducted by both classes then obtained the pre-test mean score of both classes is similar. After conducting statistics test obtained learning outcome of both classes is not different. After implementing the problem solving based learning model on both classes, obtained experiment class post-test mean score is higher than control class. Supported by statistics test result data which is less than significance. This means class with implementing problem solving based learning is significantly better.

Student skill on class that implementing problem solving based learning is better than conventional class. Based on student respond, activity, learning outcome data concluded that problem solving based learning implementation on electricity and electronics subject in SMK Negeri 2 Makassar. The [15] was explaining through metacognition learning can improve thinking skills Higher Order Thinking Skills (HOTS). Metacognition is part of learning that uses the level of cognitive thinking and is used in problem solving activities where the students find solutions by mapping their thinking, especially in solving circuit problems in the field of industrial electronics.

The result is relevant with study that was conducted by [16] which stated that the implementation of problem solving based learning was better in improving learning outcome than the class without implementing the learning model. The conclusion of the study stated that problem solving based model was effective in improving student learning outcome on algorithm limit function. The other study was conducted by [17] found that students were said to have technical competence, if the student had vocational skills, also had problem solving skills, innovated, and adapted. [18] states that learning models with effective problem solving models are used to improve critical thinking skills and student learning outcomes, as well as responses given by students to good problem solving learning models. [19] explains that thinking skill development that will improve learning and problem-solving performance in the workplace is an important goal for vocational education and training.

Problem solving based learning with M4PS stages

(Recognizing problems, choosing techniques/solution plans, determining solutions strategies, and recommending the results of solving Problem Solving). The results show that learning produces students' learning outcomes to increase by using M4PS stages systematically. This is if it continues to be carried out continuously, students are used to solving problems from KD (basic competencies) easily and precisely. Problem-Based Learning (PBL) is an essential tool for instructing learners in technical and vocational trades [7]. Furthermore, [20] also has the opinion that, the effectiveness of all education system depends largely on the quality of teaching and learning in the classroom, workshops, laboratories and other places where education takes place.

The effectiveness of learning model towards learning outcome after implementing problem solving based learning model in experiment class and conventional learning model in control class shows a difference between learning outcomes that is obtained from both classes. This is not an accidental thing but this is a result of the implementation of problem solving based learning. This is corroborated by [21] that (1) the use of problem solving learning at Al-Madani Vocational School can run effectively, and (2) improvement in performance in applying classical learning and problem solving learning. The results of the analysis of the experimental group and the control group using the gain of the achievement score in the experimental group were obtained at 8,3 with a standard deviation of 10,8 and a standard error of an average of 1,4. While the gain of the achievement score in the control group was obtained at 6,7 with a standard deviation of 8.8 and a standard error of 1,1. Then it can be concluded that there are differences in achievement between the experimental group and the control group. The scores obtained from the problem- solving ability post-test was analysed using the univariate analysis of covariance and it found, among other things, problem solving approaches scored significantly higher (P=0.046) on the post-test than scores of students assigned to classes using the subject matter approach. The implication of this figure is that the problem solving ability of secondary school students can be accelerated with instructional approaches, such as the problem solving technique [22].

4. Conclusion

Based on the result and discussion, the conclusions are drawn as follows (1) (1) the description of problem solving learning was carried out well with systematic steps by using the stages of M4PS, (2) students' respond of experiment class is higher than control class, (3) Experiment class learning outcome is higher than control class, and (4) Vocational competency of industry

electronics major with MAPEL Basic Electricity and Electronics was effectively problem solving based learning model is effective.

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The Conception of Building Higher-level Talent Cultivation System of Vocational Education in Accordance with the Project of "China's Education Modernization 2035"

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Abstract Talent cultivation system is an educational system in a narrow sense, and is also the main body of life-long education system. Meeting the educational modernization, guided by the "Eight Basic Concepts" mentioned in the project of "China's Education Modernization 2035", we are able to optimize the old experience-based talent cultivation system of vocational education, and to clarify its functional positioning, target and features. The author has conducted a comparative analysis of the advantages and disadvantages of the construction of talent cultivation system of vocational education with the three logical starting points as the basis, and has discovered that we shall take the cultivation of vocational skills as the logical starting point, and continuously optimize the structure of talent cultivation system of vocational education to highlight its modernized features and strengthen its functions.

Keywords educational modernization, vocational education, high level, talent cultivation system

Preface

Talent cultivation system is an educational system in a narrow sense. From the etymological perspective, this phrase is comprised of "talent cultivation" and "system"; furthermore, viewed from the perspective of dynamic talent cultivation, "it has covered multiple factors and steps of cultivation concepts, targets, mechanisms, guarantee, quality evaluation and improvement, etc." [1] From the perspective of static system constitution, "ideological and political work system has been connecting all systems of disciplines, teaching, textbooks and management, etc." [2] In a broader sense, "it is an organic whole with the internal connection of all steps, levels and fields of educational activities, putting great emphasis on the wholeness and systematic features of talent cultivation." [3] In the new era, the national-level government has been emphasizing the importance of the construction of talent cultivation system. President Xi Jinping pointed out in National Education Congress that "we shall strive to construct an educational system focusing on the all-round development of morality, wisdom and labor to form higher-level talent cultivation system". [4] The current talent cultivation system of vocational education has not reached the "higher-level", and the construction of talent cultivation system is a continuously optimizing process. In the new era, guided by the basic concepts of promoting educational modernization mentioned in the project of "China's Education

Modernization 2035", we shall construct a talent cultivation system of vocational education with distinctive educational features, which is significant in improving service abilities of vocational education, build a modern life-long educational system serving the masses, and realize the all-round educational modernization.

1. Problems and influencing factors of China's current talent cultivation system of vocational education

"In structuralism, functions are determined by structure; and functions are also able to conversely influence structure." [5] The unity of structure and function has determined the two sides of the problems of talent cultivation system of modern vocational education: structural and functional.

(1) Structural and functional problems of China's current talent cultivation system of vocational education

The main problems are as follows: firstly, the high-level technical talent cultivation system lacks multi-level classification and interconnection, "the talent cultivation system of higher vocational education has not taken shape, with urgent need of systematic reform." [6] Secondly, the talent cultivation system lacks higher-degree opening-up. "In 2016, the overall value of the industry of educational training reached nearly 2 trillion yuan, of which the value of infant education reached around 380 billion yuan, middle-school and primary-school education (extracurricular tutoring & private schools) 680

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billion yuan, vocational education 600 billion yuan, language learning and training 90 billion yuan, talent training 60 billion yuan, and enterprise training 150 billion yuan." [7] The vocational trainings and enterprise trainings have been less attractive, accounting for only 38.26% of the value of educational trainings. The target of vocational education has not covered the whole masses in the society. Thirdly, the talent cultivation abilities and quality of the system have been comparatively low. Taking the system of cultivating professional technical talents of manufacturing as an example, "the vocational educational system, with the relevant colleges and universities of the manufacturing industry as the main body, is big yet weak, and its advantages have been mainly based on its scale." [8]

(2) Influencing factors of structural and functional problems of China's current talent cultivation system of vocational education

The influencing factors of structural and functional problems of China's current talent cultivation system of vocational education are as follows: firstly, this talent cultivation system has no systematic theories. "Most researchers have been focusing on studying certain factors of the talent cultivation system, and few have conducted systematic researches by observing the system as a whole," [9] leading to the result that the construction process of the system lacks cooperativity and wholeness. Secondly, the relevant policies are not coordinated and target-oriented, and the orientation of the service guidance of talent cultivation has not been clarified, severely confining the performance of the functions of the talent cultivation system. The national-level government has been promoting the supply-side reform of talents in manufacturing industry through the project of "Made in China 2025" and the document of "Guide to Development Plan of Talents in Manufacturing Industry". Due to the fact that some areas lack the supplying guiding policies for industrial and scientific services, the vocational schools in these areas have no clarified orientation for serving the development of local economy and the relevant industries. "In China, only Jiangsu, Shanghai, Shandong and Beijing, etc., have formed typical plans for practice guided by life-long educational concept," [10] The mechanism for supporting learners in receiving cross-field education and further education is not well-developed, and the contradiction between the traditional terminal-oriented talent cultivation mode and the demand for high-degree opening-up within the cultivation system has been serious. Thirdly, there is no mechanism for accelerating and managing the system-operating

process of multi-level coordinated talent cultivation, with inefficient production-education integration. Enterprises and social organizations have not fully participated in talent cultivation, high-level qualified teachers of undergraduate and postgraduate education are far from enough. Enterprises with the abilities of improving teachers' teaching quality have not fully participated in talent cultivation, and the features of talent cultivated through production-education integration are not distinctive.

2. Objective and features of higher-level talent cultivation system of vocational education for educational modernization

The analysis of the problems of the current talent cultivation system of vocational education is helpful in optimizing this system with problem-oriented thoughts to adapt itself to the future situation. To avoid arbitrariness in practice, we shall clarify how the higher-level talent cultivation system of vocational education is like from an ontological perspective in advance, which is also the prerequisite for the scientific construction of the system. The project of "China's Education Modernization 2035" puts forward the construction of "a modern life-long educational system to serve the masses, and the service abilities of vocational education shall be greatly improved."[11] The overall objective of educational modernization and the basic functions of talent cultivation system of vocational education have determined the features of talent cultivation system of vocational education for educational modernization by the end of 2035, with the aim of improving the abilities of talent cultivation, which also represents the indirect service abilities of vocational education itself. We shall fully practice the "Eight Basic Concepts" of educational modernization, with objective guidance and in accordance with the requirements of modernization construction under socialism with Chinese characteristics in the new era, i.e., "paying more attention to morality, all-round development, full coverage of the masses, and life-long learning, as well as teaching students in accordance of their aptitude, the unity of knowledge and action, integrated development and co-construction and sharing,"[12] The talent cultivation system of vocational education has demonstrated modernized features.

(1) Paying more attention to moral orientation

We shall optimize the talent cultivation system guided by the basic concept of "moral values come first",

firstly, we shall think about what kind of talents to cultivate. "Moral values come first" means moral values are of great importance in the standard of talent cultivation system. We shall integrate the connotation and requirements of "fostering moral values through education" into every step and subsystem of talent cultivation, and take the achievements of "fostering moral values through education" as the fundamental tool for evaluating the abilities and qualities of talent cultivation. Under the guidance of the basic concept of "moral values come first", we shall transfer the objective of talent cultivation from cultivating a single-dimensional talent to cultivating talents with both high-level scientific and humanistic qualities.

(2) Paying more attention to the feature of opening-up

We shall optimize the talent cultivation system guided by the basic concept of "education shall serve the whole masses" by continuing the opening-up process of education, gradually increasing the number of cultivated talents, and satisfying the needs of national-level strategies and local economic development. We shall also "pay attention to every individual" by respecting the distinctive features of everyone, meeting individual's needs of diversified learning, and focusing on the fair of the process and the results of talent cultivation to allow every individual to have the opportunity to have a wonderful experience and to meet their needs for multi-level high-quality education.

(3) Paying more attention to vertical and horizontal connection

We shall optimize the talent cultivation system guided by the basic concept of "paying more attention to life-long learning", representing the life-long features of individual learning, as well as its flexible and opening-up features: the former requires life-long learning to transfer from the mode of terminal-oriented cultivation mode into life-long fostering and cultivation mode. Vocational enlightening education, vocational preparation education and vocational continuing education are vertically connected to continuously discover, cultivate, develop and improve the sense and potential of individual life-long learning. The latter requires improvement of regular and non-regular recognition and certification mechanism, to facilitate the horizontal interconnection among education of different categories, to support individual's regular and non-regular learning, with the aim of building a continuous and inter-supporting ecological system.

(4) Paying more attention to social adaptability

We shall optimize the talent cultivation system guided by the basic concept of "paying more attention to teaching students in accordance with their aptitude" to resolve the contradiction between the diversified needs of individual distinctive learning of talent and the old traditional talent cultivation mode, with more attention to social adaptability. We shall conduct the method of teaching students in accordance with their aptitude, and solve the problems of short supply in educational resources, and deficiencies in management according to the principle of the unification of all-round and individual development. We shall take the need-oriented way to change our views towards teachers, talents, evaluation and educational time-space, to improve the mechanisms of vocational guidance and consultation, promote the innovation of intelligent educational evaluation methods, to expand the educational time-space with methods of intelligent education, with the aim of creating more customized learning environment, improving the feasibility and scientific level of category-based guidance and teaching in accordance with students' aptitude, and removing all time-space obstacles in individual's all-round, life-long and non-structural learning.

(5) Paying more attention to applicability and practicality

We shall optimize the talent cultivation system guided by the basic concept of "paying more attention to the unity of knowledge and action," with more attention to the applicability and practicality of the system. The concept of "the unity of knowledge and action" includes the meaning of "knowledge and action go hand in hand, and learning and doing shall be united". We shall use this concept to guide the work of talent cultivation to let students know what and why to do, as well as how to do it in a better way. The process of talent cultivation shall, therefore, put emphasis on the integration of industry and learning, and that of knowledge and action to build a coordinated talent cultivation mechanism with integrated education and training ideas, and the unity of knowledge and action for greater achievements, with the aim of cultivating high-level inter-disciplinary and innovative technical talents.

(6) Paying more attention to the features of integration

We shall optimize the talent cultivation system guided by the basic concept of "paying more attention to integrated development," with more attention to the

features of integration. "Integration means the working modes, processes and results exerted among things featured by attraction, which has the basic function of promoting the positive interaction, consistence in objectives and balanced development." [13] Vocational education's talent cultivation mode of school-enterprise cooperation and production-education integration has determined the feature of integration in this system. The high-level depth, width and validity of production and education in the process of talent cultivation has laid the foundation for the practicing of the basic concept of "co-construction and sharing", with the aim of forming the driving power and confining mechanism of co-construction and sharing. "Sharing is the final aim of co-construction, on the contrary, co-construction is the only way of realizing sharing." Co-construction is the basic form of creating profits for talent cultivation system of vocational education, and is the major way of facilitating the coordinated development of the quality and profits of the system.

4. Logical starting point of building higher-level talent cultivation system of vocational education for educational modernization

The reorganization and optimization of the structure of talent cultivation system of vocational education needs to be guided by scientific methods. The multi-layered feature and structural connectivity of the system have determined the complexity and systematic feature of the construction of the system. The search of the logical starting point of talent cultivation system of vocational education is related to the issue of "what is the scientific starting point",[14] We shall be able to discover the starting point and basis of the construction of the system from the perspective of analyzing the "qualitative prescription" of the cultivation system, and based on the above results, to construct the system in a systematic, scientific and highly efficient way.

(1) Some disputes on the logical starting point of the construction of the talent cultivation system

Recently, scholars have different presumptions towards the logical starting point of talent cultivation system of vocational education, such as target starting point, practice starting point and vocational skills starting point, etc. Firstly, the presumption of target starting point takes "target" as the logical starting point of system construction, with the advantage of "target determines the content and ways of talent cultivation, and the different cultivation results, with the functions of guiding and

promoting the process of system innovation."[15] The way of determining the cultivation ways according to the positioning of cultivation target is able to highlight the objective-oriented and plan-oriented features of talent cultivation, however, the target-oriented behaviors put great emphasis on results and efficiency, as well as control and improvement, yet neglecting process and methods. We shall know that target is an external factor, and if we neglect the motility of the object of talent cultivation and the generativity of the cultivation process, then we create tools, not cultivate talents. Furthermore, the process of talent cultivation lacks flexibility, with high-level difficulty in setting accurate and appropriate goals for talent cultivation, which will negatively influence the achievements of cultivation. Secondly, the presumption of practice starting point puts great emphasis on the "practice-orientation" of talent cultivation. Apart from emphasizing the importance of teaching practice, it also pays special attention to the combination of teaching and labor production, with the aim of forming a learning mode integrating labor with social practice to improve the level of connectivity among talent cultivation, its working mechanism and process, and to help students form and improve their practical skills of using knowledge.[16] The combination of education and labor is one of the methods of cultivating all-round talents. It takes logical methods as the logical starting point, with process-oriented feature. The process of practice is not simple and abstract, while the construction of talent cultivation system is highly subjective, and the generativity of the construction process will lead to uncertainty in final results. The significance of practice has been over-emphasized, and the object of vocational education only knows how to do it, without knowing why. The "talents" cultivated in this way have low abilities of applying knowledge and making innovation. As a result, the level of talent cultivation system cannot be further elevated. Thirdly, the presumption of vocational skills starting point is the simplest and most abstract compared to the above two: it holds the opinion that the cultivation system of professional talents shall strengthen the cultivation of applying technical skills. The construction of talent cultivation system based on vocational skills is able to form distinctive cultivation features of professional skills.[17]. The construction of talent cultivation system according to the ideas in this presumption puts great emphasis on the professionalism of talent cultivation system, yet neglecting the educational features of the system.

(2) The rationality and practical strategies of taking vocational skill cultivation as

the logical starting point of the cultivation system

The construction of talent cultivation system has not been isolated. It belongs to the subsystem of talent development system and modern vocational education one, it shall also demonstrate the multi-level features of human resources development. China has classified technical talents into five levels, of which high-level technicians are called high-level talents. Technical talents include three categories of technology-oriented, composite-skills-oriented, and knowledge-skills-oriented. [18] The multi-level feature of high-level talents and the multi-category feature of technical talents have offered evidence for systematically optimizing the target subsystem in the talent cultivation system according to the principle of "talent's skills matching their technical levels". Taking vocational skills as the logical starting point, we are able to improve its integration degree from the perspective of overall optimization of human resources development, and optimize the framework of talent cultivation system according to the theory of stages of vocational growth. Furthermore, we can also use the constructing methods of life-long education system to optimize the talent cultivation system. "One effective method of the development of life-long education system is the method of qualification structuring,"[19] "qualification structuring is to construct a continuous and recognizable qualification stairs according to the relevant requirements of knowledge, skills and abilities."[20] We can use the method of qualification structuring to optimize the talent cultivation system, which is closely related to qualification formation. The logical relations of qualification, knowledge and skills are also related to the core issue of the construction of the framework of these cultivation systems. We shall include the talent cultivation system of vocational education into the national-level plan of the development and management of human resources, and build a new talent cultivation system through internal and external interaction, which is good for the facilitation of the interconnection among educational chain, industrial chain, talent chain, policy chain, and innovative chain and the improvement of cultivating abilities of talent cultivation system of vocational education. Obviously, compared to the above three presumptions of logical starting point, the logical starting point of vocational skills cultivation is more inclusive, strictly following the rules of human resources development and the rules of systematic cultivation of technical talents, and demonstrating the modernized features of the construction of talent cultivation system of vocational education.

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From "Machines Substituting Humans" to "Humans and Machines Dancing together": Role Positioning and Educational Shaping of Engineering and Technical Talents in the Course of Industry 4.0

Tang Linwei[1], Huang Silei[2]

Abstract In the course of the development of the Fourth Industrial Revolution, the Engineering and technical talents mainly play such five roles as the legislators of the new industrial standards, the enterprises' tutors of innovation and entrepreneurship, the dancing partners of the autonomous AI system, the doctors of the running of the production system and the bodyguards of the technologies and data security. To shape the five roles, the following measures in China's engineering and technical education should be taken: to cultivate comprehensive professional competencies in the core of innovation training, set up curriculum renew mechanism according to the current industrial technology, strengthen sense of professional roles via action-oriented teaching method, improve teaching effectiveness by employing modern educational technologies, perfect deep integration system of industry and education to cultivate students' living laboring capacity, and to build a humanistic professional culture centered by sense of responsibility education.

Keywords Industry 4.0, lean management, engineering and technical personnel, role positioning, educational shaping

Introduction

Over the past few hundred years, the engineering and technical talents has dramatically changed the world in which humans work and live. In the course of The Fourth Industrial Revolution, with the replacement of Labor by machines, the position and role of highly skilled engineering and technical talents has become more important. "Machines Substituting Humans" is the focus area of research and the development of the last three industrial revolutions tells us that which human activities will be replaced by machines depends not only on the technical feasibility, but also on the economic and social conditions. The same is true of Information revolution.[1] In fact, after "Machines Substituting Humans", people finally need to "reconcile" with the machine. It has been estimated that in Industry 4.0 mode, the interaction and collaboration between machines and humans will increase the operating speed and efficiency of the entire production system by 30% and 25%. [2]"Humans and Machines Dancing together " develop technology for humans, so as to realize the coordinated development of machine and humans. This paper, from the development of Industry 4.0 technology and the transformation of production organization perspectives, orientates the role of engineering and technical talents in the development of Industry 4.0, and puts forward the cultivation

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measures of higher engineering education according to the requirements of related abilities and qualities.

1.Working Environment for engineering and technical talents in Industry 4.0 process

Modern Science and technology is the basis of the producer's ability and the soul of the production tool. Accordingly, it will put forward the requirement of capacity and quality to the producer. The relationship between human and machine in the Industry 4.0 era is that some people have been replaced by new technology passively, on the other hand, the people with high technology and high skill have become more and more important. They develop themselves in harmony with technology and become the final "winners".

1.1 Production technological innovation

From a static perspective, nine technologies form the core of the Industry 4.0, which the Boston Consulting Group sees as the "nine pillars" of the Industry 4.0. [2] They are simulation, autonomous robot, big data analytics, additive manufacturing, cloud computing, virtual reality, horizontal and vertical systems integration, industrial Iot, and network security. With simulation technology, companies can spot potential problems even before they install a production line. The second is autonomous robot. Self-learning robots will be able to use the output of algorithms to make autonomous decisions, and will become more flexible, more cooperative, and able to

work with workers, and from the engineering talent there to learn working methods or skills. Third, big data analysis. Big Data analysis is primarily used to help with maintenance forecasting and energy management.With fast-growing applications in identifying potential operational errors and early detection of quality problems, the ultimate goal of the development of this technology is to achieve complete decision-making system through big data analysis, and the participation of people in the decision-making process will become "accidental" . The fourth is additive manufacturing. It mainly uses 3d printing to produce parts and prototypes, as well as to produce customized products in small batches, or to produce products with complex structure but light weight and easy assembly. The fifth is cloud computing. In the open system, a large amount of data is managed, the availability and accuracy of data are increased, the timely communication and communication of production system are realized, the anticipated or sudden changes are adjusted in time, and the flexibility of production is enhanced. The Sixth is virtual reality. Mainly uses digital enhancement technology to promote maintenance, logistics and standard operations. The Seventh is the horizontal and vertical integration of the system. Intra-company and cross-company data fusion based on standard data transfer protocol, including organization structure from

management to workshop and data integration from supplier to customer value chain. The Eighth is the industrial Internet of things. By means of information sensors, Global Positioning System, infrared sensors and other devices and technologies, a network system between machines and products is constructed to exchange information directly and autonomously between objects, thus realizing a decentralized production mode.It can improve manufacturing efficiency, promoting continuous improvement of product quality, reducing product costs and resource consumption. The Ninth is network security. Enterprise production mainly depends on the normal operation of the network system.

Overall, the Industry 4.0 wave will have a significant impact on the entire value chain from design to after sales service. In the process of value creation, the production process will be optimized by integrated computer information technology, and previously independent production units will be replaced by fully automated, integrated production lines. Industry 4.0 enables producers to quickly respond to customer needs, increasing the flexibility, speed and efficiency of the production process, while improving product quality and laying the technical foundation for the adoption of new business models.
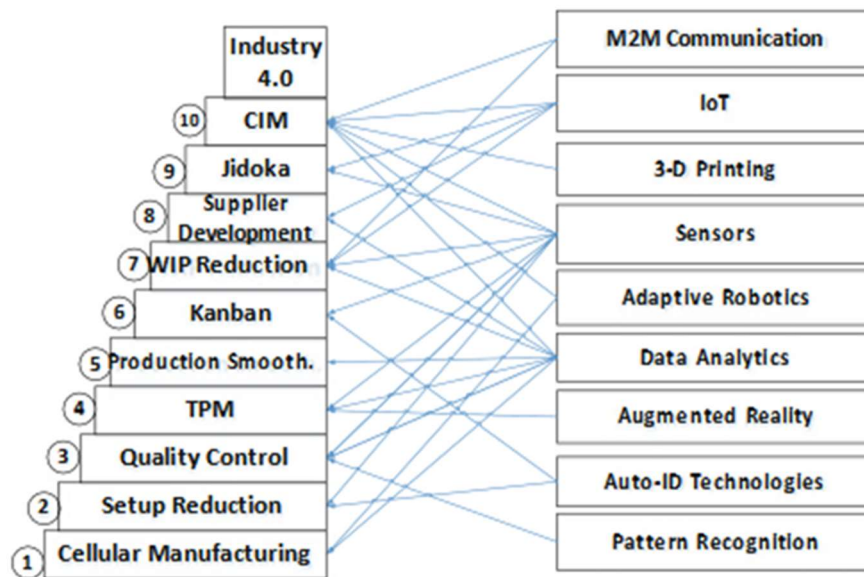

Figure 1 lean tools and Industry 4.0
(Source: ALP USTUNDAG & EMRE CEVIKCAN. Industry 4.0: Managing the Digital Transformation [m].
Springer, 2018:51.)

Table 1. Level of Lean Automation

Rank	Machine loading	Machine running	Machine discharge	Carrying
1	Workmen	Workmen	Workmen	Workmen
2	Workmen	Automaticity	Workmen	Workmen
3	Workmen	Automaticity	Automaticity	Workmen
Big leaps (big changes in cost and flexibility, breakthroughs in innovation)				
4	Automaticity	Automaticity	Automaticity	Workmen
5	Automaticity	Automaticity	Automaticity	Automaticity

Source: M Rother, R Harries. Creating continuous flow: AN ACTION GUIDE FOR MANAGERS, ENGINEERS & Production Associates. Lean Enterprise Institute, 2001.

1.2 Evolution of Labor Organization form

Through these core technologies, the Industry 4.0 has changed the relationship between the various elements of the production process, while changes in management concepts and management techniques have jointly promoted changes in the form of Labor Organization. The production organizational form of enterprises underwent three changes: the first was the standardized process initiated by the Ford and it called Taylorism; the second was the automated process that began in the 1970s and reached its peak in the 1990s; The third is the self-adaptive process which combines advanced artificial intelligence and humans. [3] The self-adaptive processes are the result of a natural fusion of lean management and Industry 4.0(see figure 1): Lean management helps to tap the potential of Industry 4.0, at the same time, avoiding "automated waste"(unnecessary waste in the process of automation, such as repeatedly moving the machine, adjusting the layout). On the other hand, the new technology is also necessary to realize the lean management concept, reducing the Labor pressure of the workshop workers, and overcome the impact of lean management. The convergence is known as lean industry 4.0 or lean automation and its advantages are mainly reflected in flexibility, efficiency, quality, and security.

1.3 Transformation of man-machine Relationship

The goal of artificial intelligence development is to achieve the metaphor that "machines are humans", but if machines become humans or partially replace humans, then our biggest concern is the relationship between humans and machines. The goal of artificial intelligence development is to achieve the metaphor that "machines are people, " but if machines become people, or partially replace people, then our biggest concern is the relationship between people and machines and also means how people are supposed to get along with machines. Throughout its history of technological change, Digital Revolution has seen the emergence of Programmable logic controller, CNC machines, Computer-integrated manufacturing, and discussions of fully automated and unmanned factories as a result of the use of robots. With the development of technology, more and more companies are aware of the increasing investment, complexity and operation cost of flexible manufacturing system (FMS). Zuehlke notes that the experience of Computer-integrated manufacturing and Digital Revolution is to reduce complexity through modularity and lean manufacturing and to encourage decentralized, self-organized production based on the level of system development, allowing concurrent engineering through decoupled processes, and ultimately developing the technology for "people.". [4] On the one hand, human creativity, flexibility, judgment and social interaction and leadership are still irreplaceable. On the other hand, the benefits that enterprises can derive from machine automation are getting lower and lower and companies that simply replace people with machines will eventually stagnate [3]. From Automation to Industry 4.0, the relationship between human and machine is shifting from the incompatible "Machines Substituting Humans" to the "Humans and machines dancing together". This means that the Industry

4.0 process is not simply a "deskilling" process, in which people's status is not reduced but increased.

2. Role Definition of engineering and technical talents in industry 4.0 process

In terms of the value creation process, they will play five main roles in the Industry 4.0 process.

2.1 "The legislator" of the new industrial standards

The increasing connectivity of machines, products, parts and humans requires the development of new standards. It will be the basis of future industrial production .Whoever grasps the standard, who will grasps "the life gate" of the future industrial production .German is a prime mover by developing industrial 4.0 and the Industrial Internet Consortium (IIC) which developed in 2014 by American-made, Internet, information technology and telecommunications companies has become an important alternative platform for manufacturing. In response, Germany has developed its own platform: "the Dialog Platform for Industry 4.0". There are other standardization organizations that are ambitious in this area because they understand that participating in standard building will be strategic for future industrial production. New production pattern of the future will all builds on such foundation structure. The engineering and technical talents need to understand how to use the new technology in different situations to create the maximum benefit for customers. They also need to do these basic but important things: deciding which business models to use, building basic technical frameworks such as a database of data analysis tools, setting up appropriate organizational structures, developing the necessary partners for digital production. Participating and developing technical standards etc. Above all kinds of factors constitute the practical basis of establishing the relevant standards.

2.2 The enterprises' "tutors" of innovation and entrepreneurship

Innovation is the premise and foundation of entrepreneurship. In order for an enterprise to change its passivity into initiative and become a leading enterprise, it is necessary for engineering and technical talents to become the "tutors" of innovation and entrepreneurship and to fully exploit the advantages of technology and manpower instead of replacing people with technology. The combination of Industry 4.0 and lean production has opened up a vast, dynamic, uncertain "Middle Ground" of human-machine collaboration. The "Middle Ground"

provides infinite possibilities for engineering and technical talents to creatively utilize and control artificial intelligence technology, making up for the defects of artificial intelligence technology and tap the unique skills of human beings.it has also expanded the space for the full and rational development of artificial intelligence. The development of the "Middle Ground" is the key point for future innovation and engineering and technical talents will use professional knowledge and skills to lead enterprises ushering in unsuitable Industry 4.0 production technologies, reengineering the production process to achieve continuous lean automation upgrades and make a leap (see table 1).

2.3 The "dancing partners" of the autonomous AI system

With the development of artificial intelligence, a large number of low-skilled jobs have been replaced, engineering talents will play an increasingly important role. The Boston Consulting Group (BCG) , which surveyed 40 job families at 23 firms in Germany, used its model to predict a loss of 610000 in manufacturing and assembly-related jobs by 2025, but in information and technology and data science related industries will add about 960000 jobs.

Technology can help people keep their jobs or return to` work, but to keep up with Industry 4.0, companies need to retrain their employees, change their organization, and develop strategic approaches which hires and trains their workforce. [5] Those who can stay in their jobs or continue to work through job transfer training are mainly engineering and technical talents who can work with machines. They will become AI trainers, on-site translators and maintainers. [3] We prefer to use artificial intelligence that mimics human behavior and physical robots or artificial intelligence software need to training. Engineering and technical talents from companies or artificial intelligence training companies will work with human resources, to design a retraining program for the workplace, allowing the machine to observe the interactive process, make decisions, correct mistakes, strengthen its strengths, and train the machine's language, posture, and empathy, making AI systems a qualified and welcome partner for people (including customers) .On-site translators' primary role is to bridge the gap between AI technology and business leaders in the event of a dispute over a system's recommendations that defy common sense or conventional wisdom. The main work includes updating the interface to enhance the interpretability of the algorithm, translating the output of the machine into insights, and explaining the mode of operation of the machine to different stakeholders. As the

maintenance personnel of artificial intelligence, the engineering and technical talents must ensure that the artificial intelligence system producing automatically is in normal working state and the system is beneficial and harmless, supervising and maintaining the artificial intelligence system.

2.4 "The doctors" of the running of the production system

Engineering and technical talents also play the role of "doctor" in the production of enterprises. First, to address the various possibilities arising from the convergence of Industry 4.0 technology and lean production, it is necessary to master the so-called "universal purpose technology" and related standards closely related to Industry 4.0, such as the Internet of things, big data, and simulation technology. They should also understand the characteristics of the enterprise itself and uphold the lean management philosophy. Secondly, the engineering and technical talents should be responsible for the normal operation of the whole production system. When big data and big data analysis cannot find potential problems in advance, engineering and technical talents should take over the problem from artificial intelligence and solve the problem quickly. Thirdly, engineering and technical talents should exercise the "muscle" of enterprises and help them slim down, such as outsourcing non-main business on the basis of standardization, which requires engineering and technical talents work out a "slimming" plan with management layer for the enterprises.

2.5 "The bodyguards" of the technologies and data security

Professional engineers and technicians are committed to improving the well-being, health and safety of all people, at the same time, the sustainability of the environment and resources should be given adequate attention according to the British Engineering Council and the Royal Academy of Engineering's 2017 Statement of Engineering Ethics. They have all made personal commitments to improving the wellbeing of society through the application of knowledge and the management of innovative teams. [6] engineering and technical talents is not only responsible for the future of humanity but they also are the only ones who can actually do it. Wadie Robinson once drew an analogy between the role of an engineer and that of a car driver: The driver controls the direction of the car and others may set the destination or suggest the best route, but the car is ultimately in the driver's hands; likewise, engineers really hold our future in their hands. [7]

Some engineering fields have been shielded from radical change by strict management rules, while manufacturing has been radically transformed, challenging engineering and technical talents' will to "make the world a better place". First, the widespread existence of the Internet of things makes it increasingly important to prevent attacks and crimes against the Internet. Second, in the Connected Economy, where data has become "virtual gold, " the benefits of moving data online have been increased computing speed, production flexibility and reducing the costs, but with it comes data security problems. Coupled with the rise of outsourcing and crowdsourcing, engineering and technical talents not only need to design high-performance security software, provide security consulting services, but also to establish digital protection mechanisms. The third is to guarantee and implement Isaac Asimov's "Three Laws of Robotics". ①

3. The Shaping of Engineering Talents Education in the process of engineering 4.0

The cultivation of engineering talents has gone through three stages: The era of "professional engineers" from the 19th century to the first half of the 20th century, the era of "scientific engineers " in the second half of the 20th century and the era of "innovative and enterprising engineers " since the 21st century. [8] In the stage of "professional engineer", there is a great deal of practical study in the training of Engineers; in the stage of "scientific engineer", the differentiation of technical talents, mathematical modeling and modern scientific technology knowledge are becoming more and more important. In the stage of "innovative and enterprising engineers", we should combine the Industry 4.0 development needs and engineering education practice and drawing on relevant national experiences to focus on six aspects of work.

3.1 Training objectives: to cultivate comprehensive professional competencies in the core of innovation training

In order to cultivate innovative and pioneering engineering talents, we must pay attention to the cultivation of students' critical thinking. Only by being dissatisfied and critical of the current state of technology and products can we create more advanced technology and products that meet the needs of our customers. People with critical thinking tend to be novel and self-directed. They don't just remember one solution. They design an "algorithm". Secondly, through the study of humanities and social subjects to lay a deep humanistic quality for students. The success stories of companies like apple and

Google show that innovation in todays' business environment requires more than a solid knowledge base in science, technology, engineering and mathematics, it also requires an in-depth understanding of basic human needs, expectations and human nature. Sevgün, the chief scientist and anthropologist at Nissan Research Center in Japan, has teamed up with traditional car designers to develop the next generation of self- driving cars. She said that if you want to provide automated partners for humans, you need to know more about humans. Third, learn the spirit of innovation in practice. Engineering colleges and universities should do a good job in the declaration and guidance of innovative and pioneering projects, and encourage the development of high-level pioneering projects that combine their specialties and cooperate with enterprises, improving the quality and success rate of innovation and pioneering projects by strengthening tutorial system.

3.2 Teaching content: set up curriculum renew mechanism according to the current industrial technology

First of all, machine learning, big data, cloud computing, Internet of things, additive printing and other knowledge and technology related to the "nine pillars" should be the core courses for engineering talents. Second, from the trend of integration of Industry 4.0 and lean production, to strengthen the integration of engineering, business and management disciplines, we should strengthen the teaching of lean production and management-related courses, learn lean manufacturing and Industry 4.0 management strategies and process designing concepts from Germany and other advanced cases. The third type of knowledge is innovation and entrepreneurship. As a kind of ability, innovation and entrepreneurship need more practice, the cultivation of this ability needs to be based on the basic knowledge, and it needs to master three kinds of knowledge about innovation and entrepreneurship: First, the "meta-cognition" knowledge of innovation and entrepreneurship, such as innovative ways, processes, mechanisms and so on. Second is the innovative materials and tools, such as nanomaterial technology, which is technology-related innovation. Third, the innovation and entrepreneurship business model which is the management and operation of innovation, such as the growing popularity of Open innovation and crowdsourcing, and enterprises can use the outer brain to achieve technological breakthroughs, engineering education should focus on these new ideas, new operations, letting students understand these ways and means.

3.3 Teaching method: strengthen sense of professional roles via action-oriented teaching method

"Interdisciplinary" is a popular term for the training of engineering and technical talents. Fraunhoferiao in Germany shows that important personal qualities for Industry 4.0 include a willingness to learn throughout life (86%), an ability to think and act across disciplines (77%), and a high level of IT skills (76%). [1] One consulting firm argues that the current process of production is "replacing production thinking with design thinking". The cross-disciplinary thinking, lifelong willingness to learn and cross-cultural learning are crucial and the future practitioners should be "T-talents", interdisciplinary and not professional. [9] From the experience of various countries, the more effective method at present is developing teaching project of engineering education which is oriented to the process or problem of engineering work, such programs should be based on real-world engineering projects, results-oriented (product development or service delivery) , and students should work in teams under the guidance of school teachers or business mentors, developing a comprehensive sense of professional roles in project implementation and practice.

3.4 Teaching means: improve teaching effectiveness by employing modern educational technologies

The development of modern educational technology provides convenient conditions and innovative space for the realization of differentiated teaching, the enrichment of teaching resources and the improvement of teaching efficiency. According to the characteristics of Engineering Education and the maturity of technology development, we should focus on developing and utilizing three kinds of educational technology: Virtual Reality and augmented reality, game-based teaching and learning analysis. Virtual Reality (VR) and augmented reality (AR) technologies are helpful in restoring real engineering situations, allowing students to compare different scenarios. Game-based teaching is to apply game design elements and game rules to non-game teaching content through storytelling, instant feedback, grade promotion and progress prompts, etc. The aim is to improve students' participation and organizational effectiveness. Learning analysis is the application of data analysis to online learning, and to understand the student's learning level, learning style through the collection of learning data, thus providing personalized learning content and learning process for students. It is helpful to help students find the specialized field of interest, stimulate the

study interest, and improve the teaching efficiency.

3.5 Training Mode: perfect deep integration system of industry and education to cultivate students' living laboring capacity

Tacit knowledge learning cannot be separated from working practice and real working environment, which is the theoretical basis of the cooperation between industry and education in engineering colleges. The case study points out that many companies are desperate to recruit new employees to meet the demands of Industry 4.0, but the acquisition of new skills requires experience in a particular manufacturing process. Although new technology applications require external support, but in-house skills development is indeed a more effective and sustainable strategy. [10] This fact proves that universities cannot train engineering talents without the support and participation of enterprises. According to the Woulfe report, graduates of top universities have no working experience in teams and no opportunity to learn from their failures. In the UK, while official documents have long emphasized the importance of high technology, the Rolls-Royce has placed apprenticeships and vocational education in an "extremely important" position with the future of advanced production to develop skills. [11] Living laboring capacity is becoming more and more important to engineering and technical talents. It not only as a static, conventional experience of working, but also as a specific way of dealing with a variety of problems in different situations. [12] Helping engineering and technical talents make the right decisions on big problems requiring not only rationality and logic but also perception, instinct and emotion. The latter can only be achieved through trial, error and constant self-correction in work practice. It is clearly stated that the acquisition of Articulate Knowledge is not complete, and the cultivation of on-the-spot working ability of engineering and technical talents requires engineering colleges and universities to go out of the "ivory tower" and "marriage" with enterprises on their own initiative, and to establish a deep integration mechanism between production and education, to enable enterprises to go from the end of the talent-training process to the whole talent-training process. Through the establishment of enterprise colleges and the implementation of mixed ownership school-running to provide students with the opportunity to acquire on-the-spot working ability.

3.6 Professional Culture: to build a humanistic professional culture centered by

sense of responsibility education

In the new century, artificial intelligence technology will bring about an "ontological" influence on mankind. The "near worry" of this technology development is an ethical problem, and the "far worry" is an ontological and epistemological problem. [14] According to Marxism, mechanization and animalization are two important features of human alienation, implying the loss of human subjectivity. The development of artificial intelligence makes human society face greater uncertainty. The loss of temporary work is only a superficial problem while the serious problem is that people lose their labor, their value, and thus lose the meaning of life. In today's technological era, engineering colleges need to take responsibility education as the center and establish a modern engineering culture that reflects the humanistic spirit. The core of responsibility is self-restraint, including self-control, self-efficacy, obligation, problem-solving and adaptability. [15] In order to train the "bodyguards" of modern technology, the education of engineering technology must do a good job in the ideological and political work of the curriculum, establishing and perfecting the working mechanism of "three complete educations" , and stress the cultivation of the sense of responsibility ,the sense of risk prevention ,and control in the daily work and professional teaching; To strengthen the objective guidance of case teaching, project teaching and PBL teaching, to complement and improve the emotional and attitudinal indicators, and to evaluate their work between personal goals and social goals by relying on a sense of responsibility, morality and mature intelligence, to shape the future elites who can harness the Industry 4.0 technology.

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Lifelong Learning and Skills for Industry 4.0

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Abstract Lifelong learning means continuous learning and learning activities, especially for adults. Lifelong learning is considered beneficial to individuals because it can improve a person's life through the improvement of work skills, personality improvement and also the addition of knowledge. The word 'Life Skills' meanwhile refers to the skills you need to make the best out of life. Any skill that is useful in your life can be considered a life skill. This paper aimed at explaining the concept of lifelong learning and life skill that is needed in Industry 4.0 (I4.0). This is a concept paper that discusses lifelong learning and life skills required in I 4.0. The analysis was obtained through the presentation of presenters in a seminar related to TVET and IR4.0 in the year 2019. There are two key factors for lifelong learning, personal growth and career advancement. These reasons may not necessarily be distinct since personal development may improve your job opportunities, and personal growth may be enabled by professional development. Furthermore, it is important to encourage the growth of learners' personality in order to cope with the competencies of complex circumstances linked to the I4.0 job activity.

Introduction

The concept of lifelong learning as defined by the OECD (Organization for Economic Cooperation and Development) is to make individuals in a society that has been motivated to continue learning through their lives both formally and informally (OECD 1996). Lifelong education is not limited to the working class only but it must pass through all groups including housewives, retirees, the disabled and the elderly. Lifelong education aims to improve the quality of life of individuals and communities. The purpose is to provide training and education to everyone with one goal to develop human capital (Ramlan et. Al, 2008).

Lifelong learning formally came into being in 1970 following the advocacy of the Council of Europe for Permanent Education, Recurring Education of the Organization for Economic Cooperation and Development (OECD) and the "Learning to Be" UNESCO Report The term lifelong education instead of lifelong learning was used in the Report of "Learning to Be". It was in the 1990s that the notion of lifelong learning gained traction again, and in its essence became global. It is a philosophy which asserts that learning is never too late. It is an attitude of openness towards new ideas, decisions,

competences and behaviours. One gets learning opportunities at all ages, at all levels in different contexts.

Lifelong learning can therefore be described as a continuum of both deliberate and unintentional opportunities that affect learning over one's life span. Dimensions of lifelong learning were also detailed along with its objectives. Even due consideration is given to the prerequisites of lifelong education, the principle of inclusion, versatility and diversity and lifelong learning as a master principle (Muhammad Javed, 2009)

Objectives

The objectives of the study were to discuss the broader perspective of the concept of lifelong learning and life skills in I4.0.

Methodology

The definition of lifelong learning and life skills has implications for the creation, implementation and assessment of education programmes. By nature, the analysis had been concise. Reports and findings from international conference presentations from diverse contexts have been used as instruments for data collection. After going through these documents and presentation, a detailed presentation according to objectives has been being made.

A wide range of distinguished presenters and participants are anticipated to participate in this conference. This conference is anticipated to gather pertinent input from TVET scholars, practitioners and industrial leaders

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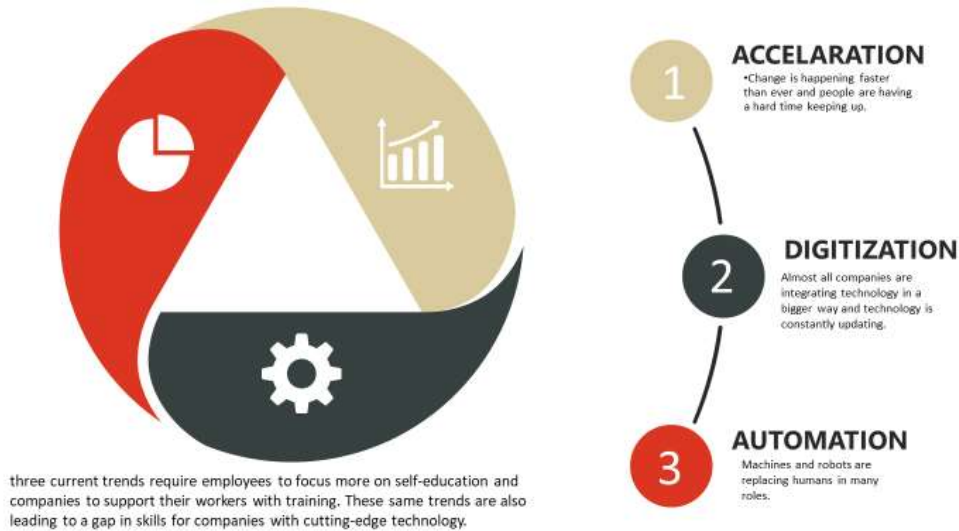
Figure 3.1: The current trends require employees to focus more on self-education and companies

to provide information for a new Framework for Future Occupational Standards and Qualification suitable for Digital Economy and the 4th Industrial Revolution era (OSAIC 2019).

Topic that have been discussed is about Lifelong Learning towards the Fourth Industrial Revolution and Life Skills Programs for the future workforce meanwhile.

Findings

Conceptions of Lifelong Learning in the Fourth Industrial Revolution

In an age when upheaval and reinvention are accepted givens of everyday business, companies and individuals are recognizing the need for lifelong learning. Lifelong learning can improve our understanding of the world around us, give us more and better opportunities and enhance our quality of life.

There are two key factors for lifelong learning: for personal growth and job advancement. These reasons may not necessarily be distinct since personal development may improve your job opportunities, and personal growth may be enabled by professional development.

Platforms for online education may not be the answer for every company or industry, but some form of continuing professional training, company-mandated or self-directed, will most likely soon be commonplace at companies or industries and in the public sector.

Experts agree that preparation for lifelong learning actually has to begin before individuals enter the workforce. Given that an estimated 65 percent of today's primary school students will have jobs that don't exist yet, kids need to be trained to become lifelong learners so they can thrive in a workplace filled with adjustments. young learners can turn study into a skill that can be a career-long support system.

The International Labour Organisation (ILO) is advocating for governments and business to invest in people's capabilities to ensure that the future world of work ensures more jobs and economic growth. It believes that by investing in people, they will be provided with an opportunity to realise their full potential and their lives will in turn have value. All countries need to make investment in the capabilities of individuals a central priority of economic policy, so that work can contribute fully to human development.

When more and more countries continue to come to terms with the Fourth Industrial Revolution, which is already changing the concept of a work, a fundamental right to lifelong learning and an efficient lifelong learning program need to be recognized. Change is a constant feature especially now that new technologies are finding their way into fields, factories and offices. It will be key

Four Core Elements For Investment

01 — a universal entitlement to lifelong learning

02 — supporting people through transitions

03 — transformative agenda for gender equality

04 — •stronger social protection.

Figure 3.2: Four corelememnts for investment in people capabilities

to allowing people to benefit from emerging technology and the following new job activities.

Lifelong learning requires more than the skills required to work; it also includes building the requisite capacity to engage in a democratic society. This provides a roadmap for youth and the unemployed to enter into labor markets. This also has positive potential: engaging in early learning makes learning simpler at later stages of life. This, in turn, is linked to intergenerational social mobility, and expands future generations' choices. But that system won't work unless it is embraced and supported by governments, employers, workers and educational institutions.

To provide an opportunity to lifelong learning, governments need to extend and reconfigure programs such as skill development initiatives, job facilities, and educational structures in order to provide employees with the time and financial resources they need to know.

Workers are more likely to invest in adult learning where income stability and job-market protection are guaranteed to them. Employers 'and employees' organisations also have a leading role to play in this process, particularly by preparation and engagement in their implementation of potential skills requirements.

Governments must design appropriate mechanisms for financing tailored to their country and sectoral contexts. And given the ongoing importance of on-the-job training, employers need to contribute to funding it. Establishing a system of training entitlements through a reconfigured "employment insurance" or "social fund" system that will allow trainers to take paid time off.

Setting up national or sectoral education and training funds in countries where most work informally, which should be operated by tripartite boards that provide staff with access to education and training, with a specific emphasis on vocational skills. Performance needs to be maintained on emerging technologies. It must be in the sense of access to universal quality education, delivered by well-trained and well-paid teachers whose competencies, experience and mentorship cannot be replaced by technology.

Governments create quality assurance mechanisms for lifelong learning and monitor the effectiveness of the lifelong learning system together with the employers 'and workers' organizations. To become truly lifelong learning, the skills have to be portable. A strong lifelong learning system, combined with universal social protection, allows workers to assume responsibility for proactively engaging in their own learning, including anticipating the skills they will need to stay employed, identifying how to acquire them and receiving the necessary training.

Life skills programs in ASEAN countries for the future workforce

TVET's positive influence in economic development is the proper design of the relevant curricula based
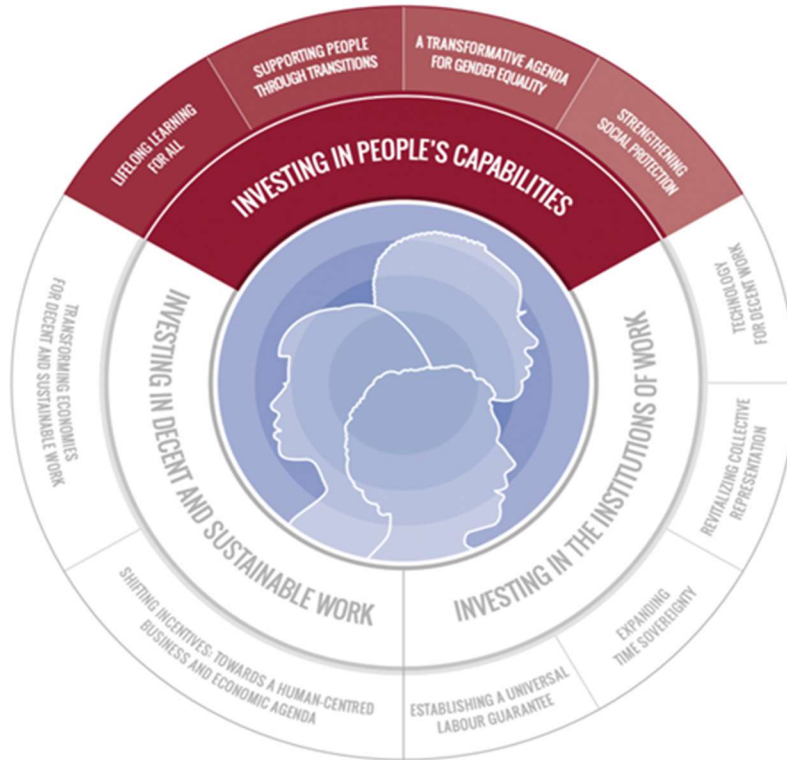
Figure 3.3: A lifelong learning program, paired with universal social security, encourages workers to take responsibility for constructive participation in their own learning

on the identification and analysis of market needs.

The development of TVET 's curriculum should take account of:

Learners and their needs, in particular their prior schooling, aptitude and work opportunities;

His relationship to the entire education system;

Determining the exact purpose of the trainers and;

Promoting the growth of the learner 's personality in order to deal with the skills of dynamic environments related to potential working practices.

Empowering Digital Skill in I4.0

Digital skills are defined as those needed to use digital devices, communication applications and networks to access and manage information. According to the National Centre for Vocational Education Research (NCVER) digital skills have to be positioned alongside the existing five foundational skills areas which are learning, reading, writing, oral communication and numeracy. Industry 4.0 connects the digital and physical world using technologies like machine-to machine communication, artificial intelligences, machine learning and sensor technologies.

Therefore, these skills would be best developed by implementing digital literacy enhancement courses such as coding for instructors and students. The students are encouraged to improve their digital skills through online courses needed to satisfy the needs of Industry 4.0. These courses could help them to adapt and manage changing roles at work in future. These is also in order to keep up with the rapid evolution of technology and also in a competitive position in various industries so it would be best to encourage students to master the latest technologies or digital technologies. Other elements such as communication, critical thinking, collaboration, creativity, problem solving, technical skills, digital skills, social skills and social values are also important to encourage the students to master in order to suit the demands of Industry 4.0.
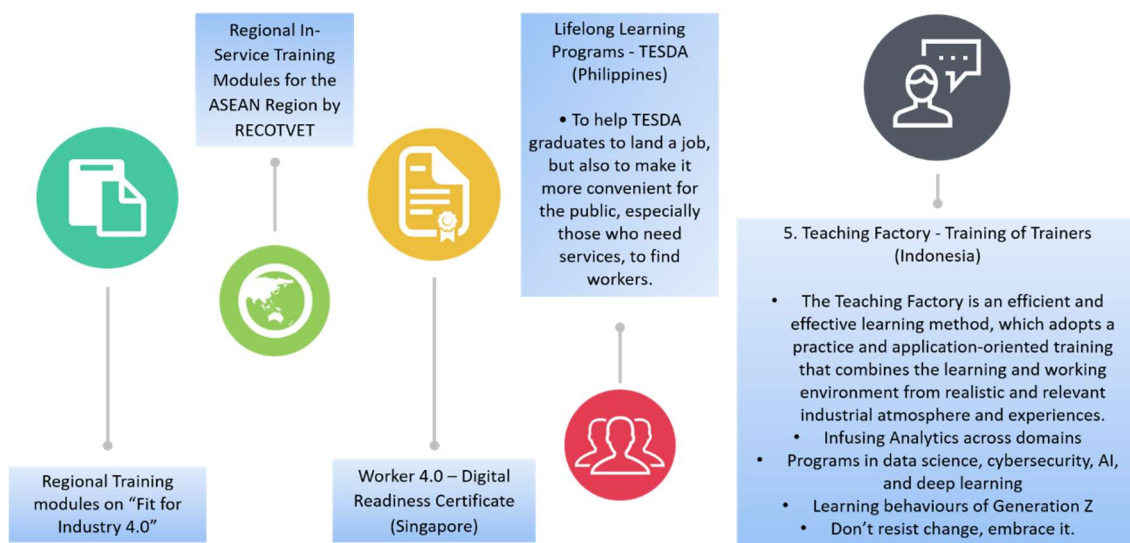
Figure 3.4: Life skills programs in ASEAN

Life Long Learning Standard & Curriculum for Skills Development in 4IR

Lifelong learning standard and curriculum for skills development in 4IR are illustrated in the figure above. There are eight (8) standard and curriculum skills development in the 4IR explained in details below.

i. Curriculum delivery is diversified with mixed learning, pedagogy, heutagogy and service-learning

The diversified curriculum delivery will help to create more flexible curriculum by providing multiple routes. It promotes scientific projects or projects in courses of inter-, multi- and disciplined disciplines. Through these methods, it can combine various disciplinary courses to cultivate skills in terms of creativity, communication and self-esteem.

It is easier to encourage different method of delivery such as online teaching and learning, education 4.0 and exploration of heutagogical and pedagogical approaches. Therefore, it is best to provide internal and external courses for lecturers to be in line with the latest and diverse teaching methods. This can be achieved by providing complete and efficient infrastructure within the institution so that educators and students can maximize their use and place long term emphasis on management.

Institution should encourage foreign instructors to improve their knowledge and skills in industry and institutions rather than sending foreign instructors. The diversified curriculum delivery also should implement integrated curriculum through internal or external courses across disciplines.

ii. Network of national and international levels to offer more versatile program and gain professional body recognition

To be able to develop skills in Industry 4.0, more programs that have the opportunity and characteristics of mobility should be created. This will help to identify and define courses offered by the institutions that has the value of student's marketability and accepted by the state accreditation body. Institution also should offer program that includes a combination of multiple courses in it such as technical, content and soft skill at once.

External certificates that are recognized by the professional body also should be taken by students as this will strengthen ties and networks between institutions and abroad institutions to enhance teacher professionalism and field expertise.

By engaging the industry in "Teaching and Learning" in a more structured way can strengthen the student training modules for example by extending the duration of industrial training. This will increase the percentage of the assessment in the form of soft skills rather than the theory either in the institution or place where the students conduct practical training.

iii. Institutions-Industry' as a strategic partner in the implementation of the

skills development program

To strengthen the student training modules and extend the duration of industrial training, engaging the industry in "Teaching and Learning" in a more structured way is recommended by adding new modules in terms of skills and practical training in the industry.

iv. Merger of formal and non-formal skills education

Merger of formal and non-formal skills education creates a modular course where students need to take certain certificates for example attendance certificates and skills certificates that will combine soft skills in each course so as not to drop out in terms of communication and confidence. Students are required to pass certain levels or standards in the program provided while in the industry either theory or soft skills so that the theory learned in schools combined with industry can be applied especially in terms of generic skills.

v. High technology innovation in teaching and learning

High technology innovation in teaching and learning helps to provide e-mobile learning ecosystems reviewed for TVET. Each instructor has to improve their
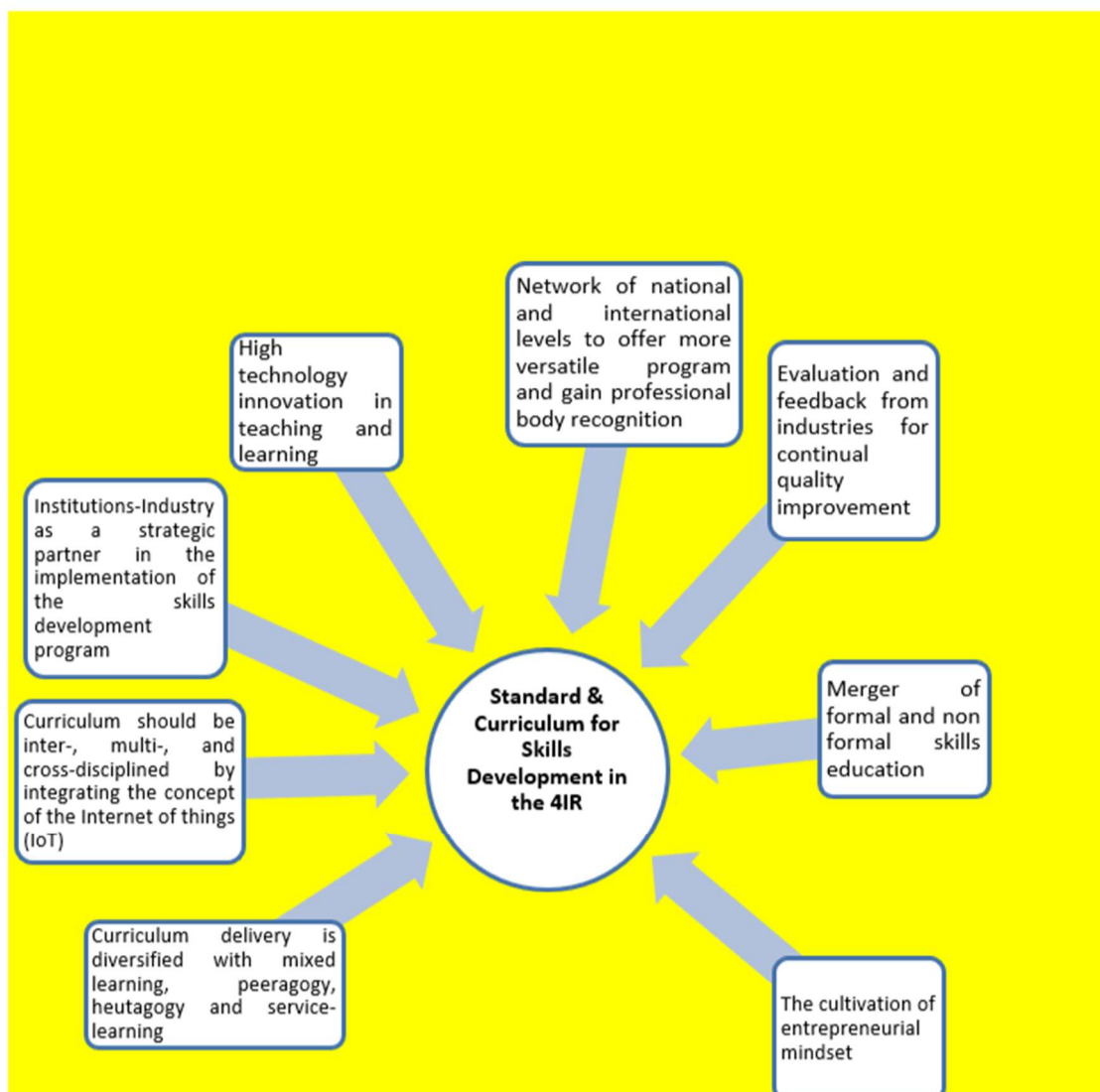
Figure: Standard & Curiculum for Skills Development in the 41R

digital skills so that they can conveyed to the present generation. Instructors are also encouraged to use different tools and digital skills in teaching and learning so as not to miss the outside world.

Institutions should provide lecturers with modular courses to be consistent with techniques, strategies and teaching methods that enhance student understanding. Providing lecturers with specific and right equipment and software can also help so that they can exposed to the latest technology and do not feel awkward when using them in the industry.

vi. The cultivation of entrepreneurial mindset

In order to cultivate the entrepreneurial mindset, latest program in entrepreneurship should be provided especially the online system in the course of study. This will give the students benefits to graduates with company registration process even though they are still in the institution of study. Exposing them with the mindset will help to facilitate the process of registering research results through the nation's intellectual property at minimum cost so that it is easily marketable. The program should provide investment savings for entrepreneurial graduates so that they can continue to do business.

Students should also be exposed to the expansion program after they leave the institution to not be left alone. Increasing the number of research results and prototypes as intellectual property will provide entrepreneurial courses for interested students and incorporate entrepreneurship elements to non-interested students.

Introducing a "4.0 Industry Mindset" where it is no longer the era of TVET graduates to "seek work", but to "create their own career" will provide comprehensive ecosystem to graduates who are interested in becoming entrepreneurs. With proper infrastructure, access to entrepreneurial training model, collaboration with training institutions and international organizations can help to encourage more innovations to be generated through entrepreneurships.

vii. Curriculum should be inter-, multi-, and cross-disciplined by integrating the concept of the Internet of things (IoT)

Early exposure from childhood education using technology in every subject taught by the teacher will emphasize meta cognitive from instructors and students on how to use technology in problem solving as early as at the school level. Student should be able to incorporate planning activities, tasks, skills related to internet technology and strategies problems solving.

Internet of things (IoT) integrated curriculum are

able to introduce a set of compliance assessment skills using technology at institutional level. The integrated curriculum also will introduce digital technology in depth and eliminating analogue skills so that they can compete globally.

viii. Evaluation and feedback from industries for continual quality improvement

The evaluation and feedback from industries is crucial as a feedback channels to improve student skills during training. The industry feedback should be considered so that the students from the institute not only practice the work culture of doing what is being directed but they can possess skills that are not in the field of study. Students' feedback also should be taken in consideration in terms of suitability and the need for reports that the institution can accept on the deficiency that can be improved after industrial training.

Additionally, through conferencing or industry-based workshops student can attend the required courses in industry-required skills. This is important for the state industry needs so that institutions can fulfill it.

Conclusion

The government today sees that human capital development is very important especially making human capital a first class mind. The development of human capital must be comprehensive especially in rural and inland areas of the country. All groups whether working, unemployed, retirees and senior citizens must be knowledgeable and can contribute something to the country, especially in the field of education and economy.

Lifelong learning is a form of education which in one way or another covers the whole of individual life. This concept has different characteristics and dimensions that reflect societal learning to be and learning.

In the 4th Industrial Revolution (4IR) (Zakri Hamid 2019), lifelong learning is a must! Countries will face two moving goals in the next decade to meet the Sustainable Development Goals (SDGs) and raise the level of national skills to survive and thrive in the so-called Fourth Industrial Revolution. Students, particularly undergraduates, should be equipped with the communication, creativity, collaboration and critical thinking skills of Industry 4.0 — the 4Cs. The problem in the future is not a lack of opportunity for employment, but a shortage of skills that the new jobs will require. Three emerging trends for workers to concentrate more on self-education and for businesses to help their employees with training: FIRST is growth as change is occurring faster than ever and people are struggling to keep up; SECOND is

digitization, as almost all companies adopt technology in a bigger way and technology is constantly being updated; THIRD is automation, since in certain tasks computers and robots replace humans. Educators are to train young people for the disruptive new economy. Whereas the old economy has been resource-focused, the new economy is knowledge-intensive and that has the connection to lifelong learning and life-skills.

Instructors need to change the minds of students from the habit towards sharpening the generic skills of students in terms of communication (verbal, digital, visual, animation), critical thinking, problem solving, collaboration, creativity (as part of innovation), entrepreneurship, team management, decision-making skills, social skills, consulting skills and ability to adjust.

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Enterprises Participating in Vocational Education and Training in China: Cost-Benefit Analysis

Yunfang Ran[1], Weiping Shi[2]

Abstract Purpose: This study investigates the costs and benefits of Chinese enterprises participating in vocational education and training (EP-VET) to analyze the influencing factors.

Design/methodology/approach: this study analyzed the costs and benefits of EP-VET. It then sent 168 questionnaires to managers to collect data on the real costs and benefits at the firm level.

Findings: While the sample enterprises received a net benefit in the short-term, nearly half of them encountered net costs. The average gross cost and benefit balanced after the fourth month. However, a company did not recoup all its prior investment until the ninth month.

Research limitations/implications: All samples were taken from the Shanghai and Zhejiang provinces of China, which may limit the generalization of our conclusions.

Originality/value: This is the first experimental study to address the costs and benefits of Chinese EP-VET and its influencing factors.

Keywords Enterprises participating in vocational education and training (EP-VET), Returns on investment, Influencing factors, Regression analysis

1. Introduction

The decreasing demographic dividend in China has affected domestic enterprises in two ways. Not only the country's low cost has advantage started to erode, but also HR is becoming more demanding. Compared with other ways of supplementing the labor force, many enterprises now participate in vocational education and training (EP-VET hereafter). However, demand for EP-VET is rather limited. Specifically, enterprises and vocational schools are not cooperating sufficiently closely or broadly to make EP-VET fruitful.

Profit-oriented enterprises decide on EP-VET by calculating and comparing its costs and benefits (Ran, 2015). A few studies in Germany have shown that cost/benefit factors play significant roles in EP-VET.

Studies in Switzerland have also revealed the direct influence of costs and benefits on enterprises' motivation to pursue EP-VET (Muehlemann and Wolter, 2014). Further, in the United Kingdom, enterprises only take part in apprenticeships if it is possible for them to receive a return on investment (ROI) (Ryan et al.,2007). However, the costs and benefits of EP-VET in China remain unclear. Therefore, this study, by combining qualitative and quantitative methods, seeks to first clarify the components of the costs and benefits of EP-VET and then design suitable approaches and models for scientifically evaluating those components[1]. Methodologically, a regression analysis is used to identify influencing factors that could cause differences between enterprises.

2. Literature review

The concept of the costs and benefits of apprenticeships was first raised in Germany in the mid-1970s. This study measured the costs and benefits of "dual-process apprenticeships" and their approaches became reliable references for subsequent research. Later, a few studies extended research in this field (Von Bardeleben and

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[1] In this study, "vocational education and training" represents middle or higher vocational schools aiming to

acquire certification, while our target programs contain replacement internships.

Beicht, 1999). The representative research on an enterprise's benefits for collaborating with vocational schools was conducted by the BIBB in 2000, 2007, and 2012 (Beicht et al., 2004; Wenzelmann et al., 2009). Later, other scholars assessed training cost, benefit, and quality through questionnaires (Muehlemann and Pfeifer, 2016). In Switzerland, Hanhart and Schultz (1998) were the first to suggest how to revive apprenticeships, although investigators subsequently shifted their research focus to the cost/benefit perspective (Dionisius et al., 2009; Fuhrer and Schweri, 2010; Muehlemann and Wolter, 2014). Studies in the United Kingdom have also analyzed the costs and benefits of apprenticeships (McIntosh, 2007; Hasluck et al., 2009; Gambin et al., 2010), including at the sector level.

By contrast, studies of the Chinese EP-VET market are limited. Some investigators have referred to the costs and benefits of EP-VET in theoretical studies (Cheng and Gu, 2012) and empirical research (Ran and Shi, 2016). However, most such studies have been synthesis discussions related to the results of foreign works. To our best knowledge, no experimental study has been conducted targeting the costs and benefits of Chinese EP-VET programs. As examining EP-VET in China could offer useful and comparable information for international study, it is urgent to carry out experimental studies of Chinese EP-VET.

3. Methodology

As the first empirical study of EP-VET in China, this study adopted a set of approaches based on the studies in Germany, Switzerland, and the United Kingdom, but altered in accordance with the unique economic characteristics of China.

3.1 Interviews

In the first step, in-depth interviews were carried out with managers of 67 enterprises from the Shanghai and Zhejiang provinces. Enterprises were randomly chosen from a database of those already registered and involved in at least one EP-VET program. Interviewees were directly in charge of EP-VET programs in those enterprises, such as HR managers and CEOs.

Our interviews focused on six aspects: enterprises' purpose for taking part in these programs, enterprises' willingness to be involved in these programs, actual cost of EP-VET programs, available benefits, potential risks, and factors that may affect training costs and benefits. After that, a focus group comprising another 12 enterprises' cost/benefit experts was run to further extract the components of EP-VET programs in China as well as classify these possible variables.

3.2 Cost/benefit analysis

The following components that may influence the costs and benefits of EP-VET in China were identified[2]. Specifically, enterprises' training costs include:

(1) Information searching costs: enterprises' expenditure on searching for suitable schools and costs on decision-making;

(2) Direct or indirect costs of trainees: wages, bonuses, and social insurance that enterprises have to pay for trainees; protective clothes and other working equipment;

(3) Direct or indirect costs of trainers: costs of non-special training conducted by HR personnel; costs of skill training by full-time trainers and part-time trainers; production loss for conducting training;

(4) Costs of training venues, equipment, and materials: costs that enterprises have to pay for training; equipment depreciation costs; costs of stationery and tools; raw materials consumption, and costs brought about by inferior products;

(5) Investment in product R&D: labor or material costs for cooperation with vocational schools.

The benefits that enterprises derive from training include:

(1) Short-term benefits: avoidable costs by trainees' replacement work; repayment as productive value created by trainees[3];

(2) Benefits from resource-sharing with collaborating schools: resources include training sites, facilities, and HR such as vocational teachers;

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[2] The most popular EP-VET for enterprises in China is to place students in the real working process. Usually, internship periods for students from middle vocational schools last for 12 months (six months for students from higher vocational schools).

[3] Enterprises also continue to reap benefits in the long-term. Once trainees are retained as formal employees, they benefit from their productive value. Further, investing in apprenticeships also helps expand enterprises' influence on the market. However, as these components are extremely difficult to monetize, they are excluded from the current model.

Table 1. Cost and benefit components of EP-VET and the percentage of total value

	Component	CNY	%
Costs	Cost of information searching and decision-making	233.4	0.6%
	Payment made directly or indirectly to trainees	23921.7	66.0%
	Payment made directly or indirectly to trainers	10136.5	28.0%
	Cost of site use and material consumption	1601.3	4.4%
	Investment in product or technology R&D	375.7	1.0%
Benefits	Short-term benefit derived from trainees' replacement work	38895.8	95.8%
	Benefit from resource-sharing with cooperating schools	807.4	2.0%
	Subsidies from government	895.6	2.2%

Table 2. Summary statistics of gross cost, gross benefit, net benefit, and ROI

	No. of observations	Lower bound	Upper bound	Mean	SD
Gross cost	161	12358	72664	36268.6	12400.74
Gross benefit	161	9293	120825	40598.8	19661.90
Net benefit	161	-48243	79825	4330.2	18915.07
ROI	161	-74%	275%	18.6%	60.1%

(3) Subsidies from governments (tax cuts or credits); EP-VET-oriented subsidies and bonuses.

As concrete numbers on those individual components of costs and benefits are closely linked to specific occupations and the product value and profitability between enterprises varied considerably, this posed an obstacle to calculating enterprises' costs and benefits of training. Therefore, in accordance with previous research in Germany and Switzerland, this study used an hourly payment to indirectly estimate some of the components of training costs and benefits, while an apprentice's productive value was measured compared with that of a fully skilled worker. All costs and benefits were given on a per trainee basis.

3.3 Questionnaire

Questionnaires were sent to 36 interviewees previously interviewed to pretest its validity. face-to-face interviews were conducted with 168 respondents to guarantee validity and reliability, and there were 161 valid questionnaires (response rate 95.8%). Enterprises' basic features comprised operation period, company size, industrial sector, and development stage (Appendix A).

4. Results

4.1 Proportions of components varied between enterprises, but training costs and benefits both relied heavily on HR
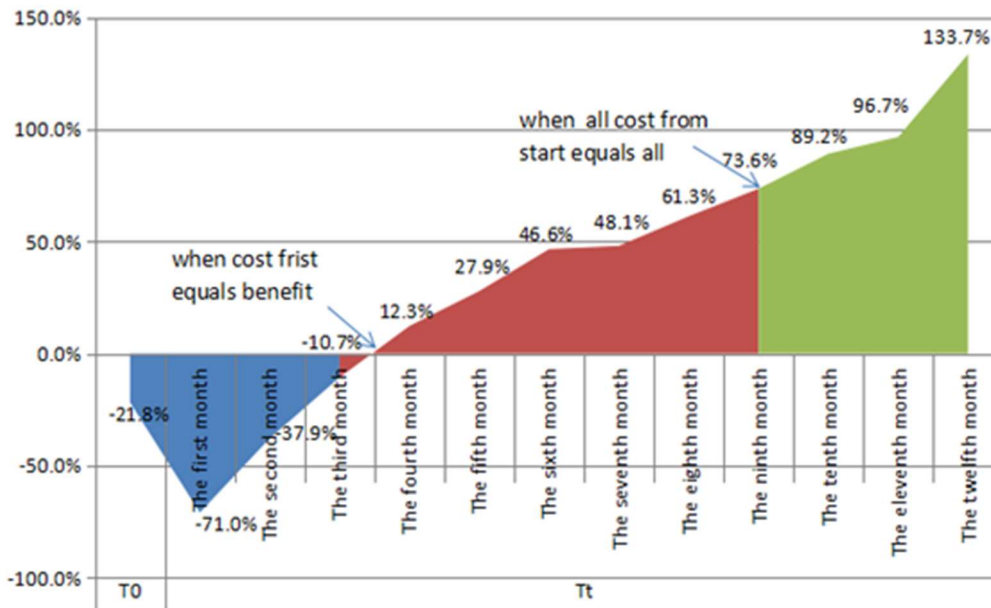
Figure 1 ROI of EP-VET in different stages (CNY)

factors

As shown in Table 1, the average training costs directly or indirectly by enterprises was 23921.7 CNY per trainee, which accounted for 66% of total training costs. Payment made to trainers was 10136.5 CNY per person (28% of total costs). The other three components accounted for 6% of the gross cost. The short-term benefits generated from trainees' productive work amounted to 38895.8 CNY per person, which comprised most of the cost (95.8%).

4.2 Training was profitable in the short-term, but nearly half of enterprises made a loss

As shown in Table 2, the average gross training cost for enterprises was 36268.6 CNY per person and the gross benefit was 40598.8 CNY; therefore, the net benefit of training was 4330.2 CNY. These results suggest that most enterprises in China could benefit in the short-term. However, there was huge difference between enterprises and industrial sectors. The highest benefit was 79825 CNY per person and the lowest was -48243 CNY per person, while the difference between maximum and minimum ROI was 349%.

4.3 Costs and benefits offset each other in the fourth month of training, with

investment recouped by the ninth month

As shown in Figures 1, the ROI of training were negative for the first three months (i.e., training costs were above benefits). From the fourth month, however, the costs and benefits offset each other and ROI reached zero (breakeven point). After the fourth month, the benefits in each stage were all above costs. Data on gross cost and benefit showed that enterprises reached a cost/benefit breakeven point in the ninth month. At this point, they fully recouped all their prior investment and began to earn money.

4.4 Multivariate regression analysis

As some of the factors that could cause such differences were categorical variables, dummy variables were used to test their influence. Correlation coefficients were then used to represent the relationships between these variables (see Table 3). Influencing factors were divided into enterprises' basic features, HR features, and training characteristics. The adjusted R^2 values show that the residual for the model fit the normal distribution.

As shown in Table 3, enterprises' operation period, enterprise size and ownership type have no significant effect on ROI. For ownership type, in terms of industrial sector, training in the construction and IT service sectors incurred lower ROI than manufacturing sector, but hotel service sector incurred higher ROI than manufacturing

sector. ROI for growth, recessionary, and transformational enterprises were lower than those for start-up companies. Enterprises that had full-time trainers invested more in training, meaning that their ROI were lower than those that did not have full-time trainers. Hence, as the proportion of employees with a middle or higher vocational school degree rises, the more likely are enterprises to employ workers at these levels and the more possible it is for enterprises to value the cultivation of skilled workers. In terms of training features, the number of trainees and retention rate of trainees were correlated negatively with ROI. Training period was positively correlated with ROI.

5. Discussion

5.1 Determining enterprises or occupations to receive a subsidy

Enterprises experience large differences when carrying out training programs. Some start earning money in the short run, while others make a loss during the whole training period. The labor market in China has many shortcomings (e.g., free-riding), preventing enterprises that follow an investment strategy from shifting to a production strategy. Therefore, training quality may be at risk as more enterprises treat trainees as cheap labor and require them to work on simple or even unskilled tasks. Hence, subsidies should be provided to those that make a short-term loss to encourage them to continue training.

5.2 Setting personnel and material-oriented subsidies and providing mechanisms for cost sharing between enterprises, governments, and schools

These results suggest that the depth of training is insufficient. when setting training subsidies, governments should first give enterprises HR bonuses based on the wage of skilled workers and trainees' relative productive value. Second, trainers' bonuses could also be used to compensate for employees' productive loss. Third, governments could provide a material consumption subsidy to enhance trainees' accessibility to equipment and tools. As the same time, vocational schools should encourage cooperating with enterprises, such as training teachers to make them able to participate in product development (Ran and Shi, 2015).

5.3 Making proper plans for time distribution during training and giving assurances to students and schools

Training period has a significant influence on enterprises' training benefit. As trainees' productivity starts to elevate and finally reach the same level as skilled workers, enterprises gradually earn from training, recouping their initial investment (Stevens, 1994). This distribution explains why most enterprises prefer not to train employees for only three or six months, during which time students are less likely to add value and enterprises risk incurring a high net cost. Training period also affects enterprises' net benefit and their training motivation. If the training period is sufficiently long to allow the productive value of trainees to overtake their wages, enterprises would invest in training. Nevertheless, a long training period only offers limited rewards to students. Once they are equipped with the basic skills, replacement work would become meaningless labor tasks.

6. Conclusion

The presented empirical results lead to the following four main conclusions. First, while the components of the costs and benefits of EP-VET showed tremendous differences, the main costs were payments to trainees and trainers, while the main benefits were repayments as productive value created by trainees. Second, the enterprises that took part in EP-VET tended to receive a net benefit in the short term, but nearly a half of them encountered net costs. Third, average gross benefits and costs balanced after the fourth month. However, not until the ninth month did a company recoup all its prior investment. Fourth, ROI was related to the number of factors including enterprises' basic features, human resource features, and training characteristics.

Appendix

Table A Summary statistics of factors that may influence the cost and benefit of EP-VET

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Table 3 Multivariate regression analysis of ROI

Model	Non-standardized coefficient		Standardized coefficient		
	B	Standard error	$Beta$	t	Significance
Enterprises' basic features					
Operation period	-0.002	0.002	-0.099	-1.377	0.187
Enterprise size	3.194	0.000	0.014	0.199	0.842
Industrial sector (baseline: manufacturing)					
Construction	-0.317	0.175	-0.128	-1.810	0.072
Logistics	0.208	0.179	0.084	1.165	0.246
IT service	0.326	0.165	0.137**	1.973	0.050
Auto service	0.172	0.137	0.098	1.252	0.213
Business service	0.823	0.139	0.462***	5.919	0.000
Hotel service	-0.236	0.119	-0.173**	-1.981	0.050
Enterprises' development stage (baseline: start-up companies)					
Growth enterprises	-0.534	0.188	-0.391***	-2.836	0.005
Mature businesses	-0.496	0.186	-0.414***	-2.659	0.009
Recessionary enterprises	-0.533	0.244	-0.204**	-2.181	0.031
Transformational enterprises	-0.600	0.207	-0.344***	-2.897	0.004
Enterprises' HR features					
Ratio of employees with a middle or high vocational education degree	-0.517	0.200	-0.432**	-2.581	0.011
Enterprises with full-time trainers	-0.526	0.246	-0.202**	-2.141	0.034
EP-VET characteristics					
Number of trainees	-0.005	0.003	-0.157**	-2.191	0.045
Training period	0.001	0.001	0.164**	2.518	0.013
Retention rate of trainees	-0.526	0.225	-0.168**	-2.337	0.021
Constant values	0.568	0.281		2.022	0.045
R^2					0.466
Adjusted R^2					0.399

*** 1% significance level, ** 5% significance level

The Role of Vocational Education and Training in Multicultural Integration in Taiwan

Xiao Lan[1]

Abstract This article argues that under the state led policy of promoting the integration of diverse cultures into Taiwanese society, vocational education training can provide a new way for immigrants to enter the labor market with their ethnic advantage. It also brings cultural integration to the family, improves family education and harmony. Historically Taiwan has been a multi-ethnic society. With the increasing number of marital immigrants and new generations of immigrant families, the so called 'New Residents/ New Immigrants' have become the fifth largest ethnic group in Taiwan.

This article will unpack the educational reforms since the launch of Taiwan's New South-Bound Policy, which aims to develop the New Second-Generation as market assets for national development and promoting multiculturalism. Next, it will examine the vocational training programs which train New Immigrants to be teachers of their native language and culture. As a result, the new approach of native language training under the NSP brings different ethnic cultures into the host society. It also empowers the immigrant mothers to have a greater voice in childrearing.

Keywords Marital immigrants; Neoliberal multiculturalism; People-oriented education, vocational training of language teaching; New South-Bound Policy

The Role of Vocational Education and Training in Multicultural Integration in Taiwan

This article argues that under the state led policy of promoting the integration of diverse cultures into Taiwanese society, vocational education training can provide a new way for immigrants to enter the labor market with their ethnic advantage. It also brings cultural integration to the family, improves family education and harmony. To support this claim, this paper will examine evidence from the past four years of the New South-bound Policy (NSP), an initiative launched in 2016. Policy-makers in Taiwan launched the NSP as a strategy to make the country more competitive in global markets, with a specific focus on forging a "sense of economic community" by strengthening regional relationships with the 10 ASEAN countries, South Asia, Australia, and New Zealand. At the same time, one of the policy's domestic agendas is to enhance the assimilation process of the growing number of immigrants who move to Taiwan for marriage or better work opportunities. The number of foreign workers and foreign spouses who have moved to Taiwan from these countries has increased rapidly in recent years, transforming Taiwan from an immigrant exporting country to immigrant importing country.

1. Hokkaido University, Japan

Historically Taiwan has been a multi-ethnic society with 4 different ethnic groups, which are Hokkiens, Hakkas, people whose ancestors are from other parts of mainland China and Austronesian Taiwanese indigenous people. With the increasing number of marital immigrants and new generations of immigrant families, these so called 'New Residents/ New Immigrants' and New Second-Generation have become the fifth largest ethnic group. At the same time, the New Immigrants from various countries brought their home country languages and cultures to Taiwanese society, and have made a great impact of multiculturalism to Taiwanese society.

With the rise of the global economic system, countries around the world have had to adjust their policies to strengthen their international competitiveness. Global competitiveness is often based on the concept of human capital, which emphasizes the link between the function of education and economic growth (Xu & Jiang, 2015). Under the global economic system, in most neoliberal countries, the competitiveness of a country is highly depended on the multicultural ability, whether its citizens are able to compete/collaborate with people with different cultural backgrounds. Whether Taiwanese society can accept these New Immigrants and whether the New Immigrants can integrate into Taiwanese society is affecting whether Taiwanese society can continue its positive development towards internationalization.

The NSP, which is known in Taiwan as the transformation from its 'interest-oriented' policy to 'people-

oriented' ideal, has started to acknowledge the new eth-
nic others (marital immigrants) from South-east Asian
countries. The NSP redefines the ethnic difference of the
New Second-Generation as a market asset for globalized
national development, which is considered to be shifting
the regime of marital citizenship in the direction of 'ne-
oliberal multiculturalism.' Scholars have used the con-
cept of 'neoliberal multiculturalism' to describe how ne-
oliberal states and organizations embrace multicultural-
ism as a new strategy of governance that recognizes lim-
ited cultural rights and promotes cultural diversity, while
domesticating ethnic inequality and neutralizing politi-
cal opposition (Lan, 2019).

Even though there are arguments regarding inter-
cultural equality and injustice in the distribution of cul-
tural rights, the NSP has increased the social recognition
of the marital immigrants and their children. With the
policy turn, not only the children, but also the mothers
are considered to be valuable resources to promote the
policy practice and educate children about their ethnic
culture. Educational reform also comes with the policy
turn. A wide range of educational reforms have been im-
plemented from basic education to higher education,
such as expanding exchange of international students
with ASEAN and South Asian countries, supporting the

education of New Second-Generation, and promoting
Southeast Asian cultural and language education etc.
Under the circumstance that schools are required to offer
New Immigrants' native languages classes, teachers are
urgently needed to conduct the curriculum.

This article will unpack the education reform which
aims to develop the New Second-Generation as market
assets for national development and promoting multicul-
turalism, and then examine the vocational training pro-
grams which trains New Immigrants to be teachers of
their native language and culture.

This article mainly relies on resources from govern-
ment documents and reports, secondary literature to clar-
ify the current situation and issues of Southeast Asian
immigrant mothers and their children, and an interview
with a government official from the Bureau of Education
in Kaohsiung City in 2017. All of the quotes from offi-
cial documents and interviews are originally in Chinese
and translated by the

1. Background

It is generally believed that overseas marriages in
Taiwan began in 1987 when it was opened to the Peo-
ple's Republic of China (PRC), and offered people more
freedom to travel back and forth to visit relatives. Since

Table 1.   Numbers of New Immigrants

Year			2008	2018
Total			400895	539090
Sex	Male		26332	44611
	Female		374563	494479
Nationality	Mainland China, Hong Kong, Macau		263418	356874
	Other	nationality	137477	182216
		Vietnam	78950	103923
		Indonesia	26082	29853
		Thailand	8885	8822
		Philippine	6124	9484
		Cambodia	4498	4317
		Japan	2659	4870
		Korea	834	1682
		Others	9445	19265

Data Source: Department of Household Registration, M.O.I & Ministry of the Interior National Immigration Agency.
*Marital immigrants are officially acknowledged as 'New Immigrants' in public policies in 2007.

1992 people have had less policy restrictions, which has allowed for more frequent visits to relatives, increased economic and business opportunities for trade, sightseeing, cultural and educational exchanges. Another result of this better access is that cross-strait marriages are also increasing. Immigrants from Southeast Asia were caused by the "Southward Policy" in 1994, as the government encouraged business in Southeast Asia, which increased the opportunities between Taiwanese and Southeast Asian women. Since this time, the proportion of Taiwanese women receiving education and working has increased. Women becoming independent made it more difficult for men at relatively low socioeconomic status, especially in rural areas, to find suitable marriage partners. Under these circumstances, finding marriage partners through intermediary arrangements from Southeast Asian countries has become popular (Chen, 2014).

In 2018, there were approximately 500,000 marital immigrants, with a majority from the PRC and over 1/3 from ASEAN countries (Table 1). These New Immigrants are considered important to Taiwan's labor market and in-house service market. Their double productivity, which are work productivity and family fertility, is one of the ways that Taiwanese society deals with labor shortages and the population aging problem. (Wang, 2001). However, due to the low-level job and disadvantaged socioeconomic status of the families they marry into, in the past three decades, marital immigrants have been considered a threat to population quality of Taiwan

by the public. The adaptation problems of New Immigrants after marriage can be listed at various stages based on family life cycle, such as marriage adjustment problems, family and community adjustment problems, restrictions on their social relationships from their husbands and in-law families, parental education for their children, DV, divorce, single parent issues, employment and financial issues etc. (Liou et al., 2015).

With the increasing number of marital immigrants, children from immigrant families are increasing as well. These so call 'New Second-Generation' have started to enter schools. Since the 2000s, New Second-Generation children in elementary schools and junior high schools have increased significantly (Figure 1&2). The proportion of New-Second Generation, out of all students in Elementary School, was about 2.2% in 2004. It reached its peak at over 12% in 2013 and dropped to 9.3% in 2017. New-Second Generation in Junior high school has also risen up from 0.58% in 2004 to 11.3% in 2017 (Ministry of Education, 2004-2018). Due to negative stereotypes from mass media, lack of resources and cultural stimulation, poor communication between school and family, lack of programs on cross-cultural understanding at school, the New Second-Generation also faces certain challenges when they enter into schools, such as language learning problem, lack of confidence and distant social relationships etc. (Hong et al., 2015).

In 2003, the Ministry of the Interior announced the "Care and Guidance Policy for Foreign and PRC
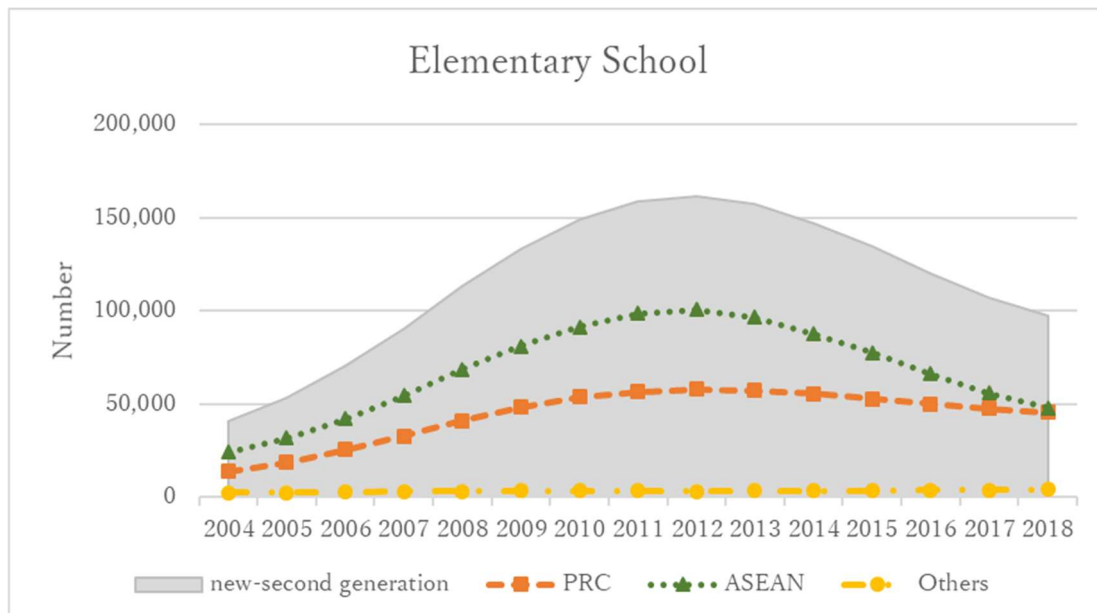

Figure 1. Number of New Second-Generation in Elementary School
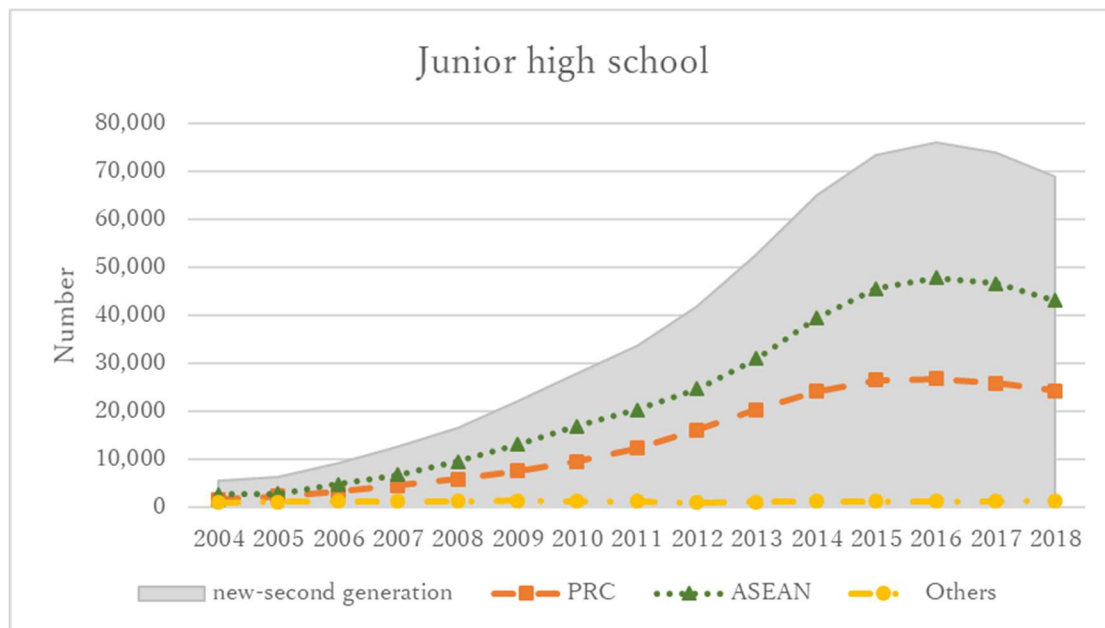Data Source: Ministry of Education

Figure 2. Number of New Second-Generation in Junior High School
Data Source: Ministry of Education

Spouses " and established the "New Immigrant Family Service Center" (in some areas referred to as "Foreign Spouse Family Service Center"). The service includes medical & health care, employment, education, personal protection from domestic violence, education for children, social awareness improvement, etc. Immigrants are provided with an education evaluation system and opportunities to take literacy classes, life adaptation classes, and vocational education and training, For the second generation from immigrant families, children are provided with scholarships such as "Taiwanese language" learning support, after-school learning support, etc. (Ministry of the Interior, 2004).

Rather than solving problems retroactively, the NSP in 2016 has taken a proactive position and started to praise children of immigrants for having the potential to facilitate diplomatic ties with ASEAN countries.

2. New Southbound Talent Development Promotion Program of NSP

In 2016, Taiwan launched the NSP as new national development strategy, which aims to build Taiwan's economic and political relations with Southeast Asia. Compared with the Go South Policy in the 1990s which aimed at building links between business and government levels, the NSP acknowledges the 'New Second-

Generation' children of Southeast Asian immigrants as valuable human resource assets of Taiwan, and 'seeks to build people-to- people links over the long term'.

In order to increase human capital for this new strategy, the Ministry of Education has started the New Southbound Talent Development Promotion Program. In the past, Taiwan's talent exchanges with ASEAN and South Asian countries were mostly one-way. Now the Ministry of Education aims to strengthen the exchange and cooperation on education to increase industrial human resources for both sides. The New Southbound Talent Development Promotion Program is mainly oriented to three aspects, which are Market, Pipeline, and Platform. Under these disciplines, the government provides high-quality education and financial support to facilitate the mutual exchange between Taiwan, ASEAN, and South Asian countries. On one hand, the government has set up scholarships to attract outstanding young students at different education stages from ASEAN and South Asia to pursue academic study and technical training in Taiwan. On the other hand, the government provides domestic students with opportunities to go to Southeast and South Asia for language studies, internship and cultural experiences. It emphasizes economic and trade management, cultural understanding, and language to strengthen young people's understanding and knowledge of ASEAN countries. (Ministry of Education, 2016a).

In short, the new education strategy has switched from "interest-oriented" to "human resources development" under the principle of "people-oriented" and "mutual exchanges". The new strategy especially aims to develop New Second-Generations' language skills and cultural knowledge, which focus on mothers' home countries, and makes use of their strengths to enhance the complementarity and cooperation between Taiwan and those countries. Policy planners announced in 2016 that New Immigrant native languages would be included in the 12-year National Basic Education curriculum from the academic year in 2018, starting from the 1st year of elementary and junior high schools. The native language courses are not limited to the New Second-Generation; all students can choose the language and culture courses so that they have the opportunity to learn new languages, understand multiculturalism, and then establish a multicultural view of respect, acceptance and appreciation. It can also expand children's international horizons and enhance their future competitiveness (Ministry of Education, 2016b).

Local government and the Bureau of Education also offers financial support to encourage the New Second-Generation to visit their grandparents in other countries during summer vacation. Cultural activities such as native language contests and Southeast Asian culture festivals are also held in local communities. For high school / vocational high school, the native languages are introduced into the curriculum as a second foreign language. Cultural exchange activities and overseas workplace experience activities with schools in Southeast Asia are also provided.

Such education policy has brought a huge change to schools. The biggest challenge is to guarantee enough teachers to conduct the curriculum of native language classes. Even though in recent years the government has been collaborating with colleges and universities to start new language courses and increase the enrollment of students related to Southeast and South Asian countries, it still remains a challenge to conduct the curriculum nationwide. The strategy is to train new immigrant mothers to be teachers of their native language, who will then be qualified to conduct the new curriculum of New Immigrants' native language from the academic year of 2018.

3. Vocational training for New Immigrants' Native Language Teaching

The training programs of native language teachers are mostly initiated by the Ministry of the Interior and the Ministry of Education, with the collaboration with various schools, colleges and foundations, and Taiwan Association for New Immigrants and Migrant Workers.

(1) New Immigrants Torch Program (NITP)

NITP was promoted nationwide in 2012 under the initiative of the Ministry of the Interior and the Ministry of Education after the successful trial in New Taipei City. The concept of NITP is to integrate New Immigrants into Taiwanese society and to cultivate international citizens through building a comprehensive network of care service and education system. With the collaboration of various schools and foundations, Immigration Learning Center, Service Centers for Foreign Spouses etc., the content includes lectures for family care visit, multicultural understanding, New Immigrants volunteer training, parent-child life experience camp, New Immigrant family creative recipe competition, and New Immigrant native language learning.

As part of this program, colleges started training programs to train immigrant native language instructors. The purpose is to encourage New Second-Generation and local Taiwanese people to learn Southeast Asian languages. The program encourages New Immigrants from Southeast Asian countries to participate in the language teaching training courses, including Vietnamese, Indonesian, Thai, Cambodian, Burmese, Filipino, and Malay. Taiwanese or foreigners at an advanced level of those languages can also apply.

The training courses include Beginning Course and Advanced Course (Table 2). Each course lasts 4 days (beginning course 28 hours; advanced course 32 hours). After finishing the course, participants can take tests including written tests and trial teaching tests. A score of 70 or more is considered a pass. Those who pass the test can receive a certificate of completion. To apply for advanced courses, applicants must have a certificate of completion of the beginning course.

The beginning course mainly focuses on practical skills such as teaching design, making teaching materials, and making teaching plans. It also includes teaching methods and skills such as teaching activity design, and classroom management methods. The content includes theories on language teaching and teaching materials design, and practical exercises include teaching content, teaching activities and methods, teaching skills and demonstrations, and comments on classroom management.

The advanced course consists of 4 parts: Explain and discuss issues related to language characteristics, the teaching of the new resident language, and new resident language curriculum planning; teaching materials production skills for preliminary training courses; teaching skills with the combination of language and culture;

Table 2.　Training Course Content of NITP

Beginning Course		Advanced Course	
Content	Hours	Content	Hours
Orientation	2	Parameters of language class planning: guidance and discussion	4
Introduction to native language teaching materials and multicultural picture books for new residents	2	Language features and the teaching of languages: guidance and discussion	4
Textbook analysis and making supplementary textbook	6	Introduction to the analysis of textbooks	2
Guidance on teaching design and teaching plan (1) Teaching content; (2) Teaching activities and teaching methods, (3) Teaching skills and classroom management	8	Guidance on textbook analysis and making teaching materials	2
Teaching demonstration and comment: (1) Teaching content, (2) Teaching activities and teaching methods, (3) Teaching skills and classroom management	10	Introduction to cultural teaching in language teaching: non-verbal language (additional language, components language, sign language, expression language, body language, space language, object language) etc.	10
		Textbook analysis and making supplementary textbook	4
		Course Progress Design	4
Test: written tests and trial teaching tests		Test: written tests and trial teaching tests	

Data Source: Enrollment Guide for "Training Talents for Native Language Teaching of New Immigrants" Ministry of Interior, 2015

course design practice. The advanced course focuses more on combining teaching theory and practice.

(2) New Immigrants Language Teaching Support Staff Training Plan (NILTSSTP)

The Language Teaching Support Staff Training Plan is initiated by the National and Preschool Education Department, which is a branch of the Ministry of Education. The training plan includes 2 parts: An Advanced Teaching Class and a Teaching Support Staff Class. The Teaching Support Staff Class is a 36-hour course that focuses on basic knowledge and skills, including the language's phonetics, grammar, vocabulary features and teaching methods of listening, speaking, reading, writing skills, curriculum design, and classroom management (Table 3). The Advanced Teaching Class is an eight-hour course, only open to those who have a certificate of New Immigrants' Language Teaching Talent Training initiated either by the Ministry of Interior or local government. The course content is mainly aimed at language teaching methods (4 hours), teaching material design (2 hours), and classroom management training (2 hours).

The benefit of the above training programs is that they are mainly targeted at recruiting New Immigrants from Southeast Asia so it can make good use of their

Table 3. Training Content of Teaching Support Staff Class

Class	Hour	Class	Hour
Introduction to Taiwan's elementary and secondary education, teaching observation	1	Vocabulary Teaching and practical use (Elementary)	3
Knowing and using Teaching resources	3	Grammar teaching	3
Phonetics and Pinyin Teaching	3	Speaking teaching	3
Read and Write teaching	3	Listening Teaching	3
Teaching materials and teaching method (1)	2	Teaching materials and teaching method (2)	2
Culture teaching	3	Class management	2
Analysis and Practice of Second Language Teaching Materials	3	Teaching practice and assessment	2

Data Source: Ministry of Education, Language Teaching Support Staff Training Course Schedule (2016-2017)

native language ability. The contents of the training programs focus on theoretical and practical exercises of teaching methods and teaching skills, so teachers of different languages can be trained at the same time. Training content that concerns different languages, such as grammar, speaking, and teaching are divided into different groups. Both of the two training programs provide different training courses according to the level of the students. Each course has its specific goals and training plans, different training hours, and content for different courses is considered to suit the needs of the students better.

With the support of the K-12 Education Administration of the Ministry of Education, a total of 2,328 New Immigrants have completed the training course and obtained qualifications as of 2018 (Ministry of Education, 2019). Each local government continues to follow the numbers of the required teachers and apply for subsidies to run training courses to meet the needs of local schools. Once the trainees complete the training course, they will be registered into the database so that schools can have access to their information and reach out to them for teaching positions.

Although the targets, time period, locations and methods of each training program are different, the training objectives are mainly in three directions. First, in order to meet the needs of teachers for the implementation of native language courses in the future; Second, to make good use of the advantages of the New Immigrants' language ability; Third, to help New Immigrants to find new job opportunities and improve their socioeconomic status.

A survey focusing on Vietnamese training indicated that the major reasons the trainees chose to participate in the training course are (1) They hope to encourage their children to learn their mother tongue; (2) Vietnamese is their own mother tongue, they can use their advantage to search for new job opportunities and change their socioeconomic status. Some also suggested that they see the development trend of ASEAN and hope to help their children to have more opportunities in the future. They also hope to promote Vietnamese culture, and to help their children use their advantage to become the best bridge between Taiwan and Vietnam. It is clear that the goal of trainees participating in the training courses is consistent with the goal of the training courses and the government strategy (Chen, 2018).

Vocational training for immigrants is not a new approach to improve social inclusion and economic status of immigrants. Research has shown that differences in human capital between native-born population and immigrants decrease over time as immigrants learn the language of the host country, gain knowledge of the local labor market, and acquire local training. Participation in vocational training in host countries is also important for the career development of immigrant women (Wong et. al., 2001; Cuban& Stromquist, 2009). Vocational training programs for immigrants has become a primary

concern of policies in host countries. The government of Taiwan has put effort into providing pre-employment vocational training programs especially for new immigrant women through corporation with public and private vocational training institutions since 2004 (Ministry of the Interior, 2004).

A study on learning experiences of Vietnamese immigrant women on vocational training programs to master Taiwanese cuisine, has shown that the completion of the training and the acquisition of the certificate empowered the women through their labor market participation by giving them a greater voice in their families, facilitated their integration into Taiwanese society, and advanced the pursuit of their life goals. The study also pointed out that the lack of cultural sensitivity in these Taiwanese-centered training programs may have led to an unintentional neglect of the complex needs and interests of these immigrant women (Wu, 2014).

While the past vocational education and training programs for immigrant women are mostly Taiwanese-centered, vocational training programs for New Immigrants' native language teaching have a different aspect regarding cultural diversity. On one hand, using the advantage of language ability of new immigrant mothers can help them to enter into the labor market/ find a new type of work. On the other hand, it can also help their children to learn their own mother tongue, which may also promote family education and family harmony. New Immigrant mothers have a weak connection and understanding of Chinese culture, which makes it difficult to give proper guidance to their children. In many cases the in-law family doesn't trust the New Immigrant mother's educational ability to educate their children. As a result, they have insufficient education authority in the role of motherhood (Liou et al., 2015). Getting a qualification for teaching their own language and culture and gaining public recognition can help them to gain a greater voice, more autonomy, and re-establish a position of confidence and authority in the family in relation to the education for their children.

A government official from the Bureau of Education in Kaohsiung City said:

"unlike social welfare, in our education department New Immigrants are not considered as social disadvantaged people, we focus more on improving their ability. In the past, our job for New Immigrants includes three aspects, which are caring, tolerance and acceptance. It sounds really warm, but it is actually 'selfish departmentalism'. We thought they were special, but we tried to make them the same as us. Now we have three new words, which are knowing, understanding and appreciation. Now we want them to be special, even Taiwanese would admire their abilities."

New Immigrants should be seen as contributors to Taiwan's multiculturalism, rather than culturally disadvantaged people. The Bureau of Education aims to improve the employment and social status of marital immigrants, which can help improve family education and harmony, as well as achieve cultural integration at school and the society. The new education reform, which includes New Immigrant's native languages and the vocational training programs for New Immigrants' Native Language Teaching, can help the bureau to achieve the above goal.

4. Conclusions and Implications

In most societies, New Immigrants are considered as culturally disadvantaged and a burden to the society. It is necessary and important to provide policy assistance to help immigrants adapt to the culture of the host country. It also should not be the only way. Under the global economic system, multicultural education is one of the keys to develop human capital to strengthen a country's international competitiveness.

The NSP, which aims to make Taiwanese citizens to have multilingual competency and be more competitive in the global arena, not only acknowledged the potential of the New Second-Generation to become valuable human resources, it also created valuable employment opportunities for New Immigrants.

With the trend of the expansion of globalization in recent years, VET has been playing a significant role in labor migration, skills mobility, and the acquisition of qualifications, etc. It is an obvious role of VET to increase human capital and employability for immigrants, which can lead to quality jobs and decent employment conditions, and support their path for social mobility and social inclusion in host counties. It also empowers them to have a greater voice in their families and the society. The previous "Go South Policy" and the resulting educational approaches, was a host country centered policy which made little attempt to improve assimilation and cultural diversity. The new approach of native language training under the NSP brings different ethnic cultures into the host society. It also empowers the immigrant mothers to have greater voice in childrearing.

Combining school education and adult vocational education offers a new model for a comprehensive life-long education system in a multicultural society. Meanwhile the framework discussed in this article also presents the role that VET can play in a global society to promote multiculturalism.

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Conflicts between Japanese Structure and German Model in Higher Vocational Education

Moriki Terada[1]

Abstract This study tries to clarify the communalities and differences among the earliest model of German University of Applied Sciences, Korean Junior and Technical College as a front runner of Japan, and the newer Japanese Professional University. Analyses are conducted by using of some descriptors developed by some preceding studies and Terada's three dimensions model. As results, we could make clear that the system design in Japan has triple sub systems, university (German type), college (American type) and articulated course of two stage (Korean type). From the view point of the relevance to occupations, in contrast to other two countries which they focus on technical occupations, Japan tends to allocate both kind of majors, occupational and broader industry- oriented ones. In the aspect of curricula, liberal arts and field practicums are characteristic as the didactical conditions, and the latter lines with Germany in the quantity level. The conflict between American-Japanese and German-Japanese model will continue, because there are quite few and short history for construction of German model in Japan.

Keywords comparative study, university of applied sciences, higher vocational education, comparative descriptor, Japanese structure, German model

Introduction

Some researchers refer to the linkage or integration of vocational education to (with) university as contemporary challenges. Especially, they are shown by Fromberger (2019) and Puukka et. al. (2012) etc. The former points out that there are three tendencies in recent vocational education at worldwide level, the curriculum's standardization of competence-oriented, the training including work experience and the transition or differentiation of vocational education to (from) higher education. About third tendency, it had already been said by Puukka as the de-differentiation and the collaboration of higher vocational education from (with) university.

So, the system of the University of Applied Sciences, named as Professional University/College in Japan, was introduced after 2019, as the result of the long term's discussions among some researchers, a few sectors of Ministry of Education (MEXT), stake holders of higher vocational education in Japan. This paper tries to clarify the communalities and differences among the earliest German University of Applied Sciences (= UAS, Fachhochschule), Korean (Junior and Technical College = JTC, 전문대학) as a front runner, and the newer Japanese Professional University (= PU, 専門職大学).

Comparison of Higher Vocational Education

First, the author would like to confirm the analytical apparatuses by reviewing of preceding comparative works or studies on the higher vocational education.

We can exemplify three comparative criteria by OECD (1973, 15-19) as the earlier work of this field, which are linkage with university, diversifying of curriculum, and national standard. Also, fairly later, Grubb (2003, 10-12) also tried to paternalize by the same three, but different criteria a little, firstly academic aim, secondly occupational aim and thirdly aim for career up or recurrent education.

On the other hand, UNESCO (1997) defined the higher vocational education as a short- term education less than three years and the occupation specific skill training, and classified it into 5 B category in contrast to university of 5 A. Similarly, EU (2005) proposed the quantitative criterion (ECTS) and the qualitive ones (comprehensiveness or self-responsibility of work and study) in the European Qualification Framework for the classification of European education institutions. Moreover, there is more comprehensive and detailed, sub-dimensions' analytical tool by EU Commission (2016). They analyze and compare the European higher vocational education by total fifteen items, such criteria as governance, quality assurance, funding, teachers, partnership etc.

Referring to some preceding methodological researches (Greinert 1993. Blossfeld 1993, Deißinger 1995), the author (Terada, 2000, 2010) re-made the comparative analytical model which was constituted of three

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dimensions. Those are the regulation- finance (A: political and regulative dimension), the training aims (B: intersystem relations and vocational preparation: sociological, labor market dimension) and the didactical characters (C: didactical dimension) of secondary vocational education. The author inlays those about twenty criteria mentioned above into the three dimensions model which is more remodeled for higher vocational education in this time, and tries to compare three countries' systems by selected 7 descriptors in this study. The System of American Community College will be set as a tacit comparator in this study.

Invited papers are informative papers written by the outstanding researchers invited by the ITEL Editorial Board.

The First Descriptor: System Design and Duration

German UAS has fifty years history and been matured since 1969 when the State Nordrhein- Westfalen (NRW) first founded this institution in Germany. There are 213 institutions, and the number of students is about 1.02 million, while general universities are 107 and have about 1.20 million students in 2019/20 (Statistisches Bundesamt, 2020, SS.7-8.). This German university is a consecutive system for 3-4 years.

Korean University of Applied Sciences is called as Junior and Technical College (JTC) in English, even though it's called as "Specialized University" in the meaning of Korean Language. It started in 1979 by combination of former junior colleges and special (vocational) training colleges. There are 137 institutions in which have 644 thousand students in JTC sector, whereas university sector 191 institutions and 2 million students in university the sector (KEES 2020). Korean JTC system becomes to be about half size of universities. So, Korean system is distinguished from German and Japanese system, as it called as "College" and if we consider that the college system is mostly constituted of two to three years courses and few four years bachelor courses. Korean higher vocational system will be not near to German, rather to American.

Japanese University of Applied Sciences is called as Professional University in Japan, and basically four years level, and it's also permitted to establish short term independent colleges or college courses within universities in some cases. Therefore, Japanese system is divided from not only German, but Korean too. There are yet only nine small universities and two colleges (MEXT, 2020). The number of students' capacities of each university are yet only 100 to 800. It's one characteristic

that PU is quite small sized.

Dimension A: Regulation and Administration

The Second Descriptor (A-1): Legislative Regulation and Administrative Subject

German UAS is regulated in each states' higher education law as one kind of higher education institutions (Deutscher Hochschul Verband 2020). Among UAS, there are relatively many public universities, 91 institutions among total 213 in 2018/19, although relatively smaller sized private universities have been tending to increase.

Korean JTC is not university, but also regulated as one kind of higher education institutions in Higher Education Act, Article 2 (고등교육법, 2017). Also, most JTC's are administrated by private corporations (128 colleges among total 137).

There is no specific higher education law in Japan and therefore the new professional universities are nationally regulated in the School Education Law. Also, the professional university and college are positioned as kinds of universities in the next article (article 87-2) after general university's article 87 (1). Of course, these universities and colleges have awarding rights for degree of bachelor or associate, and segmented from non- university sector in which some technical colleges and many specialized training colleges etc. are organized. Administrative matters are of course taken by mostly private juristic persons (8 among 9 corporations) who are applicants of establishment. Also, most corporations were and have specialized training colleges.

The Third Descriptor (A-2): Approval of Establishment and Accreditation

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The manuscript should not be submitted to more than one journal or book chapter for simultaneous consideration.

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Dimension B: Goal and Outcome of the Training System

The Fourth Descriptor (B-1): Relevance to University and Kind of Degree

§3 (2) of the Higher Education Law of the state NRW, as one case in Germany, prescribes that the UAS should "prepare for the applicable education and studies for vocational activities", whereas university aims to "acquire scientific recognitions and to develop the sciences (Wissenschaften)" (Gesetzt NRW, 2007). The degree awarded to graduates is "Bachelor" although "Diplom (FH)" that had been used for a long time until "Bologna Process" in earlier 2000's.

Korean JTC is aimed to "to teach and study on specialized knowledge and theory" and "to train

professionals" (Article 47). The degree awarded to college graduates is "Associate" which has Korean own meaning such as "Specialized Bachelor", and the degree to graduates of bachelor course is of course "Bachelor". There are some differences of language nuance.

Japanese PU has obligation that aims "to teach and study on specialized major deeply, and to develop practical and applicable abilities that are necessary to engage in professional vocation" (Article 83- 2 of School Education Law). The degree awarded to graduates is of course "Bachelor" (学士 Gakushi) because PU is one kind of university. "Associate" (準学士) is awarded to graduates of college course. But, the word such "Profession" is added behind of the international standard's titles, and they are expressed as "Bachelor (Profession)" and "Associate (Profession) in the sensitive Japanese manner.

The Fifth Descriptor (B-2): Relevance to Occupation

The total number of students of German UAS is 1,001,550. But we can understand that professional and vocational areas of published departments are focused on the applied scientific fields such as economic sciences (252,760), business management (162,429), information science (104.252), mechanical engineering (103,636), social welfare (83,108, social work 54,394), health science (55,252, health management 32,830), psychology (30,239) etc. (Statistisches Bundesamt, 2020). On the other hand, we can observe the overlapping with general universities in such fields as mathematics- natural sciences (20,070), human sciences (9,297), arts and music (29,434) etc. Rather, the aspect of scientific application is stronger than vocation education, and the fields covered are broader. Although the occupational qualification (Beruf) calls trained graduates for occupation at secondary dual system, the kind of graduate degree calls the professional occupation in Germany.

We would like to observe the department's construction on the bachelor courses in Korean JTC so we compare it with Germany and Japan. Korean bachelor courses have 108 colleges among all, and 17,200 students. The number of colleges which have bachelor courses is about 80 %, but, total number of students is only 2.7 % (KCCE,2020). Seeing the establishing situation of departments in each college in 2015, such departments which are enforced by the national technical qualification system as nursing, social care, child education, information-computer, tourism, security, architecture, interior- design, tax, dental technic and jewel craft etc. are main ground. Educational goal is so strongly

segmented between this type of colleges and general universities.

Some tendencies can be observed regarding academic character for this type of university in Japan, even though we are in the second year after starting of the new system. There are yet only nine universities and 17 departments, rehabilitation (7), information (5), fashion (4), agriculture- forestry (1). Departments which are industry- oriented are six ones. Training for qualified occupational manpower and creation of broader manpower for new industries coexist parallel. There are some restrictions for development of vocational qualification type because many departments such as social and human care, child education health science etc. have already established among general universities.

Dimension C: Didactical Aspects

The Sixth Descriptor (C-1): Liberal Arts and Major Subjects

The Seventh Descriptor (C-2): Field Practicum

Germany

There is no national regulation for curriculum of UAS in Germany, so it's controlled in each university's examination regulation. Only the praxis of the practicum semester is standardized in the state law (Gesetzt über die Hochschule des NRW §64-2).

Case of Hochschule Bochum : This public university has 34 departments oriented to engineering sciences. Among them, we make checking the curriculum stables of nine departments belong to mechatronics group (Hochschule Bochum, 2014). First, they set seven to nine semester system. The study terms of these nine courses are sometimes longer than academic universities. There is no liberal arts subject. Dare to show, students obligate to take linear algebra (6 ETCS, about 180 hours) and Physics (6 ECTS) as basic course for natural- engineering sciences. They will not expand liberal arts courses or basic courses. Specialized academic courses mostly occupy the course table.

Field practicum in enterprises as characteristic program of this country belongs to the specialized courses and it's prescribed that practicum semester is necessary for ten weeks, 15 ETCS (450 H) in §10 of examination regulation (2014). Other universities or departments sometimes provide this practicum in a few separated semesters.

Korea

Detailed curriculum structure of Korean JTC is not regulated in Higher Education Act or law or Enforcement Decree as well as Germany. Detailed management is asked to each college.

Case of Daejeyon Health Science College (Lee Myung-Hun, 2014): This college had 18 departments related to medical and health sciences in 2015. There are a few basic subjects such as understanding on college life, career guidance, social service and daily English in the curriculum tables for jewelry design course (associate course). These are not strictly liberal arts, but rather career guidance subjects. Field practicum is only 2 credits (one credit hours is one hour per week) in the second semester of the second year.

So, next, seeing the curriculum table of bachelor course for dental health area which is controlled by the national qualification, it's mostly same as jewelry course on basic subjects. But, credit hours for field practicum is a little many than associate course (3 credits in second year and 3 credit in third year).

Japan

Curriculum for the PU is regulated in detail by the "Norm for Establishment of Professional University" (Ministerial Ordinance, 2016). According to this norm, each PU has to set over 20 credits for basic (including liberal arts), over 60 credits for vocational specialized, over 20 credits for developed and over 4 credits for comprehensive subjects. Man has to provide about 40 credits (about one third of all) for liberal arts in general universities. Very, it's the influence from American university and community college system.

Moreover, the curriculum of PU is characterized as the broader specialty- oriented one, if we consider to the existence of developed subjects which aim to train the broader applicable knowledge and skills for so-called "second major".

On the other hand, practicum in enterprises which has not experienced for this type of university or college excluding national qualifications programs is fairly much quantity enough to estimate PU as a different type from Japanese traditional one, and to approximate to the German UAS. In the case of PUs, they have to provide students over 600 hours during four years for this practicum, and over 300 hours in the case of two years college.

Case of Tokyo Professional University of Health Science (2018): Approval and supervision system for establishment of P U is so rigorous in Japan. Therefore, each university's actual conditions are mostly within the range of the national norm. We pick up this new university in health science area as one case of the pattern regulated by the national vocational qualification. This university has only two departments, and capacities for each

grade is 80 persons. In one department, Physical Therapy, subjects of basic course are constituted of social sciences, natural sciences, community and volunteer, and students have to take over 20 credits from these categories. Just, it obeys to Ministry's norm. Field practicum at the stage first, second and final fourth grade for total 27 credits, 20 weeks.

By the way, we have to notice that this university has a special training college which belongs to non-university and college sector, and that it has many experiences in the field practicum. This specialized area is supervised by the Ministry of Health, Labour and Welfare, and the Ministry prescribes the qualifying norms for physical therapy. According to the norms (Ministry of Health, labor and Welfare Japan, 2017), all educational institutions have to provide the field practicum for 800 hours (20 credit). But among 800 hours, over two third (536 hours) has to been practiced in the hospital, clinic (over 400 hours) or related facility. It' not so difficult to abide by the norm of Ministry of Education. But the field practicum is so higher hurdle for non-nationally qualified fields.

Discussions for Comparisons

So here, descriptions mentioned above are inclusively shown in Table.1 Following are discussions for each box.

System Design for University of Applied Sciences

Three countries' systems are typified in to three patterns for University of Applied Science. The first type is the consecutive system (Germany and Japan), the second is the articulated system which has first and second stage (Korea and Japan), and the third is only college type (Korea and Japan). The second is near to Australian College of Technical and Further Education, and Polytechnics in many countries, and the third is the same structure as American Community College. There may be no same system as the any specific foreign model for any countries. At least, Japanese newer system has triple complicated one.

On the Way of the Regulation by the State

Discussing on the way of regulation, three systems have a communality that state or central government has always legislations for this type of university, but administrations are varied. Japan is private university-oriented, although she is strongest to obligate the Ministry norm to each university. Two concepts of political governance and de-regulation can coexist. Rather, we may be able to

Tab. 1 Comparative Table of University of Applied Science in Germany- Korea- Japan

Country	①System design and duration	②A-1: Regulation and Administration ③A-2: Approval of establishment	④B-1: Relevance to university and degree ⑤B-2: Relevance to occupation or industry	⑥C-1: Liberal arts and major subjects ⑦C-2: Field practicum
Germany		A 1: Regulated by the State	B1: Bachelor Older courses are Diplom (FH)	C1: Basically no liberal arts and specialized in each major
Fachhochschule	Consecutive over 3 years	A-1: Administrated by many public (state) universities and mid-sized private universities	B1: Positioned within higher education as well as universities	
University of Applied Sciences 1969~ State NRW		A 2: Approved by the Ministry and the third party	B2: Basically oriented to applied academic occupation, but widespread to more academic fields	C2: Many and long term practicum in enterprises
Korea	Two phase system, mostly associate (2~3) and fewer bachelor (1~2)	A 1:Regulated by the National Ministry	B1: Specialized Associate, and Bachelor (second stage)	C1: No liberal arts, but some newer basic subjects and specialized in each major
전문대학		A 1: Administrated by big public and private colleges	B1: Positioned within higher education act as well as universities	
Junior or Technical College 1977~		A 2: Approved within Ministry	B2: Basically post-secondary practical occupations	C2: Few and short term practicum in enterprises
Japan	Consecutive 4 years, two phase system and college (2~3) too	A1: Regulated by the National Ministry	B1: Bachelor and Associate (College)	C1: One half liberal arts of university and extended specialized subjects
専門職大学		A1: Administrated by mostly quite small private universities	B1: Positioned as one kind of universities	
Professional University 2019~		A2: Approved within Ministry	B2: Specified health science occupation and new industries (not specified)	C2: Fairy many practicum in newer industry branches, but mostly same as standard level of national qualified occupations

say that east Asian countries tend to think vocational education as not official, but as private matter excluding China.

Relevance to University and Segmentation from University

On the relevance of the university of applied sciences to general university, Japanese system is nearest to general university. That aspect belongs persistently to the category as one kind of higher education institution in Germany and Korea. Nevertheless, degree title's name is same as university in Germany, but different in Japan, Korea.

Relevance to Occupation

West European countries have generally labor market by each occupation (group). German System has the strong relevance to occupation (Beruf), so mastering of vocational education become to qualification. But, German UAS have a mission to train professional of applied sciences-oriented type. Korea and Japan (partially) tend to train occupations of post-secondary type.

Curriculum Structure: Liberal Arts, Major-Oriented Subjects and Field Practicum

Liberal arts courses are provided within vocational and professional institutions in Japan. It is one evidence that we can say as the same "universities" as general university. Contrary to it, it may be said that Japanese PU is weak a little in the training of specialty. But practicum is fairly signified and same level as German UAS, because field practicum is most important key word in this system.

Conclusions and Perspectives

It has become to be able to compare some systems of the higher vocational education in varied aspects, by using three dimension's model. Most significant issue in the comparison of higher vocational education is preparation for analytical concepts (apparatuses) in the each analyzed aspect. Concepts, the consecutiveness versus the division of two stages, are used for analyses in the aspect of basic system design. Regarding the aspect of regulation and administration, we can characterize each system by the concepts, the state control versus participation of the third party. Goal and training outcomes are observed from the kind of degree and the definition of relationship to general university, and relevance to occupation or industry area. Also, it's significant to analyze into didactical levels by the concepts whether liberal arts courses are obligated students or it's focused on

specialized education, whether how much the field practicums are planned for the training of practical professionals.

Anyway, Japan founded this kind of university by making benchmark of the first, German UAS and the front runner, Korean JTC. There were such difficulties as many general universities had already established some kinds of vocational colleges (faculties) since 1990's, and Japan had no labor market by a kind of occupation for reception of vocational graduates excluding nationally qualified occupation, also had fewer traditions in the industry side for reception of field practicum etc.

There is an incorrigible educational thought which views vocational human formation as non-academic and merely economical matter.

But policy makers, not a few practitioners and some scientists in the world of vocational education recognize well the significances of German model which bases on secondary Dual-System's concept. The sympathy to the new higher vocational education model has been fairly strong since 1950's when discussion for vocational university system initially occurred. The conflict between American-Japanese and German-Japanese model will continue.

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A Study of the Intent of the Application for "Universities of Applied Sciences"

Akane Oda[1]

Abstract The purpose of this study is to clarify characteristics and originalities in professional universities authorized by MEXT focusing on MEXT's recognition in a stage of an application establishment. This paper analyzed educational objectives and curriculum's characteristics of a professional university, organizations have made an application to a university's establishment and an originality in a university MEXT made a serious consideration. As the result of examine, most of organization which applied and were authorized haven't ever established universities and it seemed that they had trouble passing examinations. In addition, it was clear that MEXT required for training applied competence to take a fixed or a specific profession through setting a "developing course", however, an interpretation of a meaning of "applied competence" was a difference between MEXT and applicants in a stage of screenings and a latitude of setting of "applied competence" depended on whether a profession required a national qualification or not. To study original characteristics of professional universities in a stage of an application of establishment, these factors should be considered.

Keywords Professional university, university of applied sciences, higher vocational education, university, special training college

Introduction

The purpose of this study is to clarify characteristics and originalities in a university of applied sciences is called as "Professional university" (Japanese English) that Ministry of Education, Culture, Sports, Science and Technology (=MEXT) authorized. A professional university started as a new higher educational institution on April in 2019 and it is a new institution for the first time in 55 years in Japan. MEXT shows this new-type university as an institution of higher vocational education which implements an education cooperated with enterprises and a practical training still more compared with existing's one. They authorized 9 schools as professional universities. Previous studies (Terada:2016, Terada:2018, Oda:2017) clarified characteristics of discussions about an institutionalization of professional university and a trend about an authorization in the first year (Oda 2018). However, studies of professional universities are a little. It is necessary to examine as the following:

(1) What were characteristics of new universities permitted by MEXT?

(2) What did MEXT require for universities at the time of an approval?

(3) What was the intention of an applicant of establishment have applied to universities?

(4) What kind of exchange was made between MEXT and applicants during the examination process?

This paper examines (1) and (2) subjects the above. In the other words, this paper clarifies characteristics in professional universities authorized by MEXT and what MEXT emphasized in a screening of an establishment. It seems that MEXT strongly urge for applicants they should explain a difference between professional universities and existing universities and special training colleges and MEXT took a serious view of introducing of a new subject group in professional universities. Therefore, this paper focuses on the differences between professional universities, existing universities and special training colleges.

This paper uses the following research methods: first, the author shows characteristics of an educational purpose, a duration of study, a faculty organization, and a degree in a professional university while comparing with existing universities' and the special training college's one. Second, this study clarifies characteristics of the establishment bodies of the professional university approved by MEXT and how MEXT evaluated a status of application for the establishment. Third, the author examines what MEXT required for applicants about a uniqueness of a professional university. In analyzing of these points, this paper refers to websites of MEXT, examination documents submitted by applicants to MEXT and so on. The author aims to be clear what important factors is like for analyzing characteristics of an application of establishment.

1. A Characteristic of an Educational

1. Kurume University, Lecturer

Objective and a Curriculum in Professional University

This section makes clear educational objectives and curriculum's characteristics of a professional university on focusing the between an existing university's and special training college's one. A professional university is a new-type university which implements a practical vocational education and training cooperated with enterprises. Concretely, it sets up practical training courses more than one-third of graduation requirement credits, appoints of practitioners (more than 40% of required all teachers), four years required for graduation and awards a degree(professional). MEXT shows on their website educational characteristics in a professional university while comparing with an existing university and special training college as showing Table 1. Table 1 shows an educational purpose, years required for graduation, a teacher's organization and a degree stipulated by MEXT in a professional university, a university, and a special training college. A professional university' educational purpose is to enjoy a scholarship and the arts and develop a practical and an applied competence to take a specialized profession. The years required for graduation

Table 1 Comparison Education of between a Professional University, a University and a Special Training College

	Educational purpose	Years required for graduation	Teacher's organization	Degree
Professional-University	enjoy a scholarship and the arts and develop a practical and applied competence to take a specialized profession	four years	a practitioner and researcher who studies a professional theory and practice	bachelor's degree(profession)
University	· research activities with a focus on academics and enjoyment a scholarship and the arts · develop an intellectual, moral and applied competence	four years	a researcher	bachelor's degree
Special Training-College	train competence to take a vocation and lead a practical life and enhance a culture	not less than one year	a practitioner	licensed (highly) specialist

*source: MEXT website "What is a professional university?" https://www.mext.go.jp/a_menu/koutou/senmon/index.htm
(partly modification by the author) (Last viewed date: 29 October 2020)

is four years and teacher's organizations are composed of practitioners and researchers who studies professional theory and practice. Then a degree is awarded bachelor's degree (professional). On the other hand, a university is required to research activities with a focus on academics and enjoy a scholarship and the arts. The years required for graduation are 4 and a teacher's organization is based on researchers. They can award a bachelor's degree. Then, a special training college trains a competence to take a vocation and lead a practical life and enhance a culture and years required for graduation is not less one year. A teacher's organization is composed of a practitioner and a degree is Licensed (highly) specialist.

Furthermore, MEXT stated in a website that professional universities should educate a vivid creativity and highly practical workers which supported professional theories while introducing merits both an academic education which existing universities have implemented and a vocational education which special training colleges have enforced.

2.Characteristics of Establishment Organization and Status of their Application

2 section clarifies characteristics of organizations have made an application to professional university's establishment. MEXT approved the Kochi Professional University of Rehabilitation and the Professional Institute of International Fashion on April in 2019, the Tokyo Professional University of Health Sciences, the Biwako Professional University of Rehabilitation, the Okayama Healthcare professional University, the Shizuoka Professional University of Agriculture, the Professional University of Information and Management for Innovation, the Kaishi Professional University and the International Professional University of Technology in Tokyo on April 2019. Therefore, the number of authorized universities is nine as of April 2020 as showing Table 2.

What is a profile of a provider who established professional universities? In the first place, most of universities which were authorized were school corporations

Table 2: A List of Professional Universities as of 2020

Founding	Professional universities approved（name of bachelor ）
On April in 2019	Kochi Professional University of Rehabilitation (Bachelor of Physical Therapy / Occupational Therapy / Speech Language-Hearing Therapy)
	Professional Institute of International Fashion (Bachelor of Fashion Creation/ Fashion Business)
On April in 2020	Tokyo Professional University of Health Sciences (Bachelor of Physical Therapy / Occupational Therapy)
	Biwako Professional University of Rehabilitation (Bachelor of Physical Therapy / Occupational Therapy)
	Okayama Healthcare professional University (Bachelor of Physical Therapy / Occupational Therapy)
	Shizuoka Professional University of Agriculture (Bachelor of Agriculture)
	Professional University of Information and Management for Innovation (Bachelor of Information and Management for Innovation)
	Kaishi Professional University (Bachelor of Business Innovation and Entrepreneurship)
	International Professional University of Technology in Tokyo (Bachelor of Information Technology)
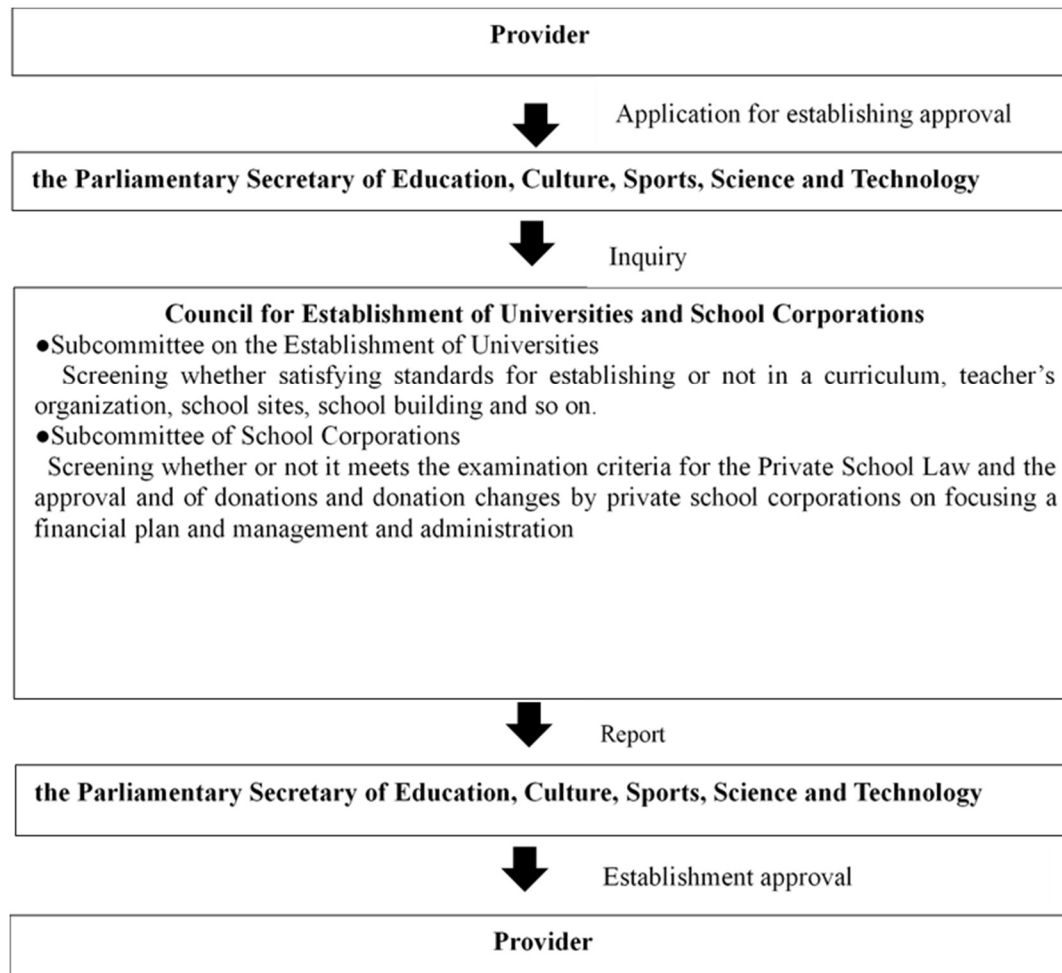
Figure 1: Outline of System of University's Establishment in Japan
*source :MEXT website "Outline of university establishment approval system"
https://www.mext.go.jp/a_menu/koutou/ninka/1368423.htm （Last viewed date: 27 October 2020）

have managed existing special training colleges apart from one university established by a prefecture: the Shizuoka Professional University of Agriculture. Details of professional universities' establishment is 2 type. First type is that school corporations or a local public body which had ever managed existing universities or special training colleges abolished existing universities or colleges and founded new universities. Second type is that school corporation have being operated existing universities or special training colleges added on a professional university. Most providers of professional universities authorized by MEXT chose the second type.

How did MEXT approve professional universities? First, as a procedure, providers applied for establishing

approval to MEXT and they submitted application's documents. Next, they inquired of about implementing a screening for Council for Establishment of Universities and School Corporations. This Council for Establishment of Universities and School Corporations composed people involved in universities, trade organizations and experts of industrial circles. The Council is composed two subcommittees: Subcommittee on the Establishment of Universities examines whether satisfying standards for establishing or not in a curriculum, teacher's organization, school sites, school building and Subcommittee of School Corporations examines whether or not it meets the examination criteria for the Private School Law and approves donations and donation changes by private

school corporations on focusing a financial plan, management and administration. After that, the Council reports to MEXT and MEXT authorized universities (Figure 1). In the first stage as above, applicants of professional universities revised and submitted application's documents in a number of times and MEXT authorized applicants. In the first year, the number of an application was 17 at the start, however, most of them withdrew for an application and only 2 schools were approved. Chairman of the University Establishment Subcommittee commented a lack of contents of education, deficiencies in documents and so on and excited attention to applicants that applicants should have consciousness about establishing a university more. The reason why MEXT commented as above was probably because they were concerned that many applicants haven't ever established universities. On the other hand, for the applicant's point of view, it may be having trouble to apply for a professional university because it was a high-level university in the side of standards for establishing: for example, setting up practical training course more than one-third of graduation requirement credits, appoints of a practitioner more than 40 % of required all teachers and so on.

3. An Originality in a Professional University MEXT Made a Serious Consideration

What is an originality is a professional university MEXT located? To begin from the conclusion, the point is a developing course which don't be organized in existing universities and special training colleges. Of course, characteristics of a professional university are various: for example, an abundant in-company training, an appointment of practitioner and small class system of the number of 40 or less and so on. However, the reason why a course of study is a core in contents of education, this paper examines characteristics of courses for a start. Then, this paper studies the point MEXT took a serious view in a stage of screening.

(1)A kind of Courses in a Professional University

First, an outline of a professional universities' curriculum shows as the following: there are 4 courses in a professional university—a fundamental course, a professional major course, a developing course and a general course. A fundamental course is for acquiring liberal arts to contribute an occupational and social independence, a professional major course is for learning competence to take a specific profession, a developing course is for acquiring applied competence in a specific profession and a general course is for mastering general competence by integrating knowledge and skills learned in other 3 courses.

(2) MEXT's Intent of Establishing a Developing Course

A developing course for acquiring applied competence in a specific profession is important as an originality in a professional university because MEXT recognized that this course is highly contents of education comparing with special training college's and existing universities' one. In 2016, MEXT published a report as the following: new institutions of higher education (= professional universities as of today) should implement a professional education based on a practical vocational education. Concretely, contents of education are for acquiring knowledge, skills, competence and attitudes to engage in a fixed or specific profession. Therefore, MEXT required for professional universities to let students acquire competence for a fixed or specific profession and it seems that they regarded this content of education as a distinction in professional universities.

(3)A Trend of a Developing Courses' Arrangement in Each Professional University

However, a latitude of a developing courses' arrangement depends on the vocational fields because a curriculum in a part of professional required national qualification is regulated by Regulations for the Designated Training Facilities stipulated in the Ministry of Health, Labor, and Welfare (MHLW) in Japan. Japanese public vocational qualification system has a role for regulating the number of professional and they also have an effect in stipulating curriculum in vocational education. For example, education of a physical therapist, an occupational therapist and a speech language-hearing therapist are regulated by MHLW at first. Therefore, it seems the latitude of curriculum in professional universities which educate about a profession required national qualification is lower than others. On the other hand, universities don't train a profession required national qualification can implement formation of developing course easily. However, the author adds that universities train professionals required national qualification also figure out a developing course formation: for example, setting up multi-professional collaboration classes in the Kochi Professional University of Rehabilitation and training presentation skills to inform information for a local community in the Okayama Healthcare professional University.

(4) What are "Applied competence" Required in a Specific Profession?

There is other problem of a developing course: the problem is an interpretation of "applied competence" trained in a developing course. MEXT demanded for professional universities to let students acquire applied competence in a specific profession by learning a developing course because they showed in a report of 2016 that an important characteristic of professional universities was a professional education for acquiring knowledge, skills, competence and an attitude to engage in a fixed or specific profession. Therefore, education for acquiring applied competence means understanding deeply about professional knowledge and practical skills and being well verse in the whole field of concerned professions. However, MEXT took a serious view of a formation of a curriculum about understanding deeply of the whole fields of concerned professions rather than a specific profession in examinations. For example, the Shizuoka Professional University of Agriculture has planned to educate a core of entrepreneurs of the agriculture and forest in at the beginning. That is why they have tried to set up a course to let learn about natural environments and landscapes into a developing course. However, MEXT commented that the content should be located a professional major course because knowledge of national environments landscapes is for a specific vocation. Nevertheless, to the tell the truth, it is difficult to distinguish between a curriculum for a specific profession and the whole fields of concerned professions' one. Furthermore, it is hard to definite "applied competence". Therefore, it is presumed that MEXT gradually decided and authorized about the content of course through an examination among universities' applicants.

From these studies, points can be summarized as the following: A Latitude of establishment a developing course in professional universities influences whether profession required a national qualification or not. In addition, the meaning of "applied competence" was a little unclear.

Conclusion

This paper examined characteristics and originalities of professional universities MEXT authorized. As a result, 3 points are cleared: first, MEXT located professional universities as educational institutions which train a vivid creativity and highly practical workers supported a profession theory while introducing merits both academic education existing universities have implemented and vocational education and training for a specific profession which special training colleges have enforced.

Second, MEXT seemed to examine strictly because most of professional universities haven't ever established universities although they have ever managed special training colleges and so on. Therefore, MEXT told applicants of professional universities to make clear a difference universities and special training colleges.

Third, MEXT regarded an establishment of a developing course as originalities in professional universities and required from training applied competence in the course. On the other hand, they didn't show a concretely content at first but they have already explained in a report published in 2016 that professional universities should let students deeply understand about professional knowledge and practical skills and be well verse in the whole field of concerned profession. Then, in stage of an examination, it is seemed that MEXT tried to locate contents of knowledge and skills in the whole field into a developing course. MEXT may be trouble because it was new universities they haven't ever examined.

This is consideration about an application of establishing on focusing an intent of MEXT. As a result, it was clear that an original characteristic in professional universities is to train "applied competence" and the setting is affected whether a profession required a national qualification or not. Therefore, it is important to focus these factors to develop a study of professional an establishment's application in professional universities. However, this paper is located to a pilot study and didn't examine inclusively in a professional universities' education —for example, a teacher's of organization, a practice training, and so on—from MEXT's point of view. In addition, this paper only examined characteristics of establishing of professional universities on focusing MEXT's point of view but a recognition in applicants of professional universities couldn't study. These points will be research in the future.

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Qualitative Research on the Dilemma of the Enterprise Practice Policy Implementation for Teachers in Higher Vocational Colleges

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Abstract For higher vocational colleges in China, the enterprise practice policy is an important driving force to promote teachers' professional development and enhance practical teaching ability. This study examines the perceptions of the teachers in higher vocational colleges, about the implementation of the policy. For data collection, 21 teachers from 6 higher vocational colleges were selected and interviewed with semi-structured guidelines. The results show that three factors that affect the dilemma of enterprise practice for teachers in higher vocational colleges, including the difficulty of integrating enterprise identity, the obvious role conflict between school and enterprise, and the low quality of enterprise practice. It is suggested that we should enrich the working experience of vocational teachers in the pre-service stage, establish a normal enterprise practice mechanism for vocational teachers, and develop teachers' awareness of professional development proactively.

Keywords Higher vocational colleges, professional teachers, enterprise practice, policy implementation, qualitative research

Introduction

When compared with general education, vocational education is regarded as an education type more closely related to industries, enterprises and industries. Similarly, for teachers in higher vocational colleges, they are required to have a high level of practical ability. According to "the Decision of the State Council of China on accelerating the development of modern vocational education (2005)", it is necessary to provide the practice opportunities in enterprise for vocational teachers. Subsequently, series of policy documents stressed the importance of practice experience in enterprise for vocational teachers. In 2016, the Ministry of education and other six departments officially issued "the enterprise practice regulations for vocational school teachers". As stated in the document, professional course teachers (including Internship instructors) should, according to their professional characteristics, work in enterprises or production service lines for at least six months every five years, and new teachers without working experience in enterprises should practice first and then take up their posts. Now, the enterprise practice policy has experienced a process from germination to development, and then to gradual improvement and it is necessary to investigate the implementation of the policy in practice.

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2. Literature Review

Relevant studies have shown that there are obvious difficulties in the implementation of enterprise practice under vocational education teachers. The positive perception is greater than the negative perception, including promoting teachers' understanding of the industry, improving teachers' practical teaching ability, deepening school enterprise cooperation and so on (Wang and Xia 2015; Cheng 2008).

However, from the perspective of vocational teachers, the implementation of enterprise policies is not very optimistic, including the imperfect system of policy implementation laws and regulations, the lack of motivation for policy implementation, and the immature supporting conditions for policy implementation (Dong et al 2015; Zhang and Guan 2016). A survey on the enterprise practice of professional course teachers in 15 Higher Vocational Colleges in Zhejiang Province shows that only 34.5% of the professional course teachers in higher vocational colleges have accumulated more than 6 months of enterprise practice, and 65.5% of them have less than 6 months (Feng 2018). Scholars have carried out a large number of studies from different perspectives on why this kind of practical implementation dilemma is caused. From the perspective of stakeholders, Liu and Xu (2015) put forward that teachers' level conditions need to be standardized, school level management system needs to be improved, enterprise level autonomy needs to be improved, and government level supporting policies need to be improved. From the perspective of social exchange

theory, Wang (2016) stated that the embarrassing situation of "positive schools, passive teachers, and indifferent enterprises" is caused by the imbalance of social exchange between the main bodies. It is mainly manifested in the fact that schools are difficult to provide enterprises with the exchange resources they need, and teachers are difficult to obtain sufficient returns from schools through enterprise practice. From the perspective of transformational learning, Li et al (2019) concluded that vocational college teachers are not sensitive to trigger events, negative effects of experience, lack of critical reflection ability, lack of rational dialogue and other dilemmas in enterprise practice, resulting in the identity of vocational college teachers as "slow", "nostalgic", "tourists" and "marginal".

The above research is helpful to understand the practical dilemma of vocational teachers. When it comes to the methodology, studies are mostly descriptive analysis of the dilemma of enterprise practice under teachers, and lack of in-depth discussion on its internal mechanism. More importantly, as the direct participants of the enterprise practice, the understanding, cognition and action of vocational teachers on the policy are directly related to the effect of policy implementation. However, previous studies lack a profound understanding of the teacher group, which will also be an important breakthrough in this study.

3. Methodology

In this study, we mainly used qualitative methods to explore vocation teachers' perceptions on the enterprise practice policy. If the quantitative research method is adopted, it is likely to simplify the problem to the relationship between variables, which is not the purpose of this study. In contrast, through semi-structured interviews, we can obtain more details about vocational teachers' understanding of the implementation dilemma.

Under the guidance of targeted sampling, the selection the interviews went through three steps: Firstly, sampling of the teachers in higher vocational teachers. The main reason is that new teachers in higher vocational colleges pay more and more attention to higher education in recent years. On the contrary, it is very difficult for highly skilled talents with enterprise working experience to teach in higher vocational colleges. Therefore, it is more urgent for vocational education teachers to carry out enterprise practice in higher vocational colleges. Secondly, sampling of the regions. This study focused on the higher vocational colleges in Jiangsu, Zhejiang and Shanghai. The reason is that Jiangsu, Zhejiang and Shanghai are one of the first areas to implement the enterprise practice policy for higher vocational teachers. It has both mature experience and prominent problems, which is relatively more typical. Based on the characteristics of the number and distribution of higher vocational colleges in Jiangsu, Zhejiang and Shanghai, three, two and one higher vocational colleges were selected to conduct interviews. Thirdly, this study selects specific interviewees according to the attributes of professional title, education background, teaching age, post type, enterprise work experience and administrative position. The main purpose is to reflect the views of different types of groups on the dilemma of implementing enterprise practice policies under the guidance of vocational education teachers through interviews, so as to make the selected samples have strong typicality. Based on the above consideration, this study selected 21 professional teachers in 6 higher vocational colleges.

According to the pre-interview and literature review, this study compiled a preliminary semi-structure interview outline, and entered the "Scene" through the introduction of acquaintances. Before the formal interview, the interviewer stated the anonymity and main purpose of the interview to the interviewees, and recorded the interview with the consent of the interviewees. Due to the limited time of interviewees, the duration of face-to-face interview is between 15-35 minutes. Then, the interviewer transcribed the interview text one by one, and all the interview materials were uploaded to NVivo 11 plus software, and further coding analysis was done with this software. Six higher vocational colleges are coded as A, B, C, D, e, F, and professional teachers are also coded as 1, 2, 3, 4, 5. For example, A-1 refers to the No. 1 professional teacher of A higher vocational college.

4. Results

Through coding analysis and theme focus, this study finds that the factors restricting the implementation of enterprise practice policy for vocational teachers mainly include the following three aspects: the difficulty of enterprise identity integration, the obvious conflict between school and enterprise role, and the low quality of enterprise practice.

4.1 The difficulty of enterprise identity integration

4.1.1 "Who am I" and "Who are you"

The first problem of enterprise practice for vocational teachers is the cognition of identity. On the one hand, professional teachers lack a clear understanding of "who I am", and it is difficult to recognize their own

corporate identity. In the view of many teachers, the enterprise practice is only to complete the tasks arranged by the school and cope with the assessment of the higher authorities. Their own work is still a teacher, but for the new identity enterprise employees, it is difficult to ask themselves according to the standards of the enterprise. As one teacher commented, 'From the teacher's own point of view, his subjective initiative may be worse. He may also want to learn something, but it is not necessary to ask him to work hard, especially to avoid some heavy and tired work. He may think that I will not do this again in the future. Many people have this idea' (E-1). On the other hand, there is a lack of clear positioning of "who are you" for the practical teachers of enterprises, so it is difficult to position them as new employees of enterprises. From the perspective of the practice mode of teachers in higher vocational colleges, except for a few participating in national and provincial training projects, most of them adopt the way of independent contact, and the common problem is that the time is short, and the practice teachers in enterprises are not even "temporary workers". In this context, for the reasons of confidentiality protection and trust, it is difficult for enterprises to treat practice teachers as their own employees. One teacher responded that, 'Enterprises will have the sense of confidentiality protection. If I am the boss, I will not let you work. This will also involve the core technology of local enterprises. Do I dare to give it to you? If you leave here, you may give my technology to others. In fact, you can't touch the core technology'(C-2).

4.1.2"New employee" starts from "Apprentice"

For the practical teachers in the enterprises, due to their "outsider" identity, it is difficult to integrate into the existing team of the enterprise in a short time. As one professional teacher said, 'as far as I am concerned, there are few teachers who really participate in the core departments of enterprises and integrate into their teams. Generally speaking, they are unable to enter the core departments, and even fewer teachers can help enterprises solve problems'(F-1). With the continuous improvement of the level of marketization and modernization, the degree of standardization of enterprise management is also improving. Except for some small and micro enterprises, most enterprises have strict apprenticeship system, that is, special masters (or instructors) are responsible for the training of new employees, which is also the only way for new employees to obtain enterprise identity. In China, teachers in higher vocational colleges are generally lack of working experience in enterprises, so it is difficult to take up their posts as soon as possible when they just

enter the enterprise practice, especially in the productive enterprises, they need to accumulate experience in the grass-roots posts. For example, one professional teacher with many years of enterprise work experience said that, 'This process of integration into the enterprise is very painful. The most difficult point is that you should learn first, like an apprentice, and understand first' (D-4).

4.1.3 Face to the difference of system and culture between school and enterprise

As two different types of organizations, there are many differences in organizational system and culture between Higher Vocational Colleges and enterprises. According to the view of new institutionalism, the environment faced by organizations can be divided into institutional environment and technological environment at the macro level. The institutional environment emphasizes the "legitimacy" of organizational survival, while the technological environment emphasizes the "efficiency" of organizational development. According to this classification standard, higher vocational colleges have typical characteristics of "strong system environment and weak technology environment", while enterprises have typical characteristics of "strong technology environment and weak system environment". These differences also shape the internal system and culture of different organizations to a certain extent. Compared with higher vocational colleges, the pace of enterprise work is faster, the requirements for performance are higher, and the work pressure is also greater. This kind of organizational system and cultural differences, in fact, also cause some difficulties for the practical teachers to integrate into the enterprise. Most professional teachers are from "school to school", lacking the ability to solve practical problems for enterprises. As one professional teacher said, 'If you have the ability, then the enterprise will certainly welcome you; however, if you can't solve the problem for him, you will become a burden to him after you go. The enterprise is very realistic, so many teachers can't get involved in the enterprise'(B-2). This kind of system and the existence of cultural differences, also reflects the lack of our teacher training link. Due to the lack of work experience in enterprises, it is difficult for teachers to adapt to the enterprise environment; if they work in enterprises for a period of time, and then work in schools, the system and cultural differences faced by enterprises will be greatly reduced.

4.2 The obvious conflict between school and enterprise role

4.2.1 Off-the job practice faced with time

problems

For teachers, enterprise practice not only means the acquisition of new identity, but also means the change of their roles, that is, they need to play not only the role of teachers, but also the role of enterprise employees. Because its main role is still the teacher, so the time arrangement is still to serve the school work. In the arrangement of teachers' working time, teaching time and auxiliary school administrative affairs time occupy a considerable proportion. In contrast, the so-called enterprise employees are more like an amateur role. Therefore, there is great uncertainty in the arrangement of school practice time under teachers. According to the current organization arrangement of teachers' practice time, most of them are arranged in spare time and summer vacation time, and the continuity of time arrangement is poor, and it is rarely possible to achieve long-term off-duty practice in enterprises. As one teacher stated, 'It's difficult for me to go to the enterprise every summer vacation. A better way is to go two or three days a week'(C-1). However, for enterprises with more strict and standardized management, the fragmentation of time arrangement will not only cause some troubles to the management, but also affect the normal production and operation order, which makes it difficult for many enterprises to give adequate support. One professional teacher said that, 'the best way for teachers to practice in enterprises is to go continuously. If we can't participate in some projects with enterprises, we will face some problems. A few months have passed in a flash. As a result, one is that time is delayed, and the other is that some things may only be half done, which is a taboo of enterprises'(E-1).

4.2.2 Enterprise practice becomes an extra burden for teachers

In a general sense, the practice of teachers under enterprises will undoubtedly help to improve the level of teachers' professional development. However, from the reality of enterprise practice under the professional teachers in higher vocational colleges, enterprise practice even becomes an additional burden for teachers, which makes it difficult for teachers to have the energy to play their own corporate role. As far as school management is concerned, due to the heavy work tasks, it is difficult for teachers to devote themselves to the enterprise practice. In fact, the more common way is that teachers still have to complete the basic teaching tasks stipulated by the school while they practice in the enterprise. However, this kind of basic teaching task in higher vocational colleges needs a lot of time and energy. As

one teacher commented, 'Teachers have to complete 480 class hours of teaching tasks each semester. However, the time teachers spend in enterprise practice cannot be converted into teaching workload. In this context, teachers are often overburdened'(E-2). Due to the limitation of personal energy, it is difficult for professional teachers in Higher Vocational Colleges to cope with enterprise practice with a relaxed mentality. On the contrary, many teachers regard enterprise practice as a task that has to be completed.

4.2.3 It is difficult to find the interest combination point between school and enterprise

Another prominent manifestation of the role conflict between school and enterprise is that the enthusiasm of professional teachers and enterprises as two important participants is not high. Under the pressure of the school, professional teachers may be able to consciously perform their own roles, but it is difficult to ensure that they perform their roles well in the practice of enterprises. For many higher vocational colleges, in order to complete the tasks assigned by the higher authorities, they have to ask the teachers to practice in enterprises by means of mandatory orders. But for the practical teachers in the next enterprise, it is inevitable that there will be "reluctant" phenomenon. As one teacher said, 'The school's real support for the teacher's enterprise practice is very small. Many teachers go to the enterprise by themselves, and the bus and catering expenses for going to the enterprise need to be solved by themselves. Moreover, the school has not given a certain inclination in the system'(A-1). In addition, if teachers want to play a good role in enterprises, of course, they cannot do without the strong support from enterprises. From the current situation, the main motivation of enterprises to accept teachers' practice is that the state will give corresponding preferential policies. However, once this kind of preferential policy stops, the practice of teachers' enterprise will also be suspended. The more important reason is that there is no deep reciprocity mechanism between schools and enterprises. As one teacher commented, 'Because today's enterprises, if you are like private enterprises, they are basically running for achievements, while teachers in higher vocational colleges have achievements, and very few of them can produce achievements'(C-4).

4.3 The enterprises practice quality cannot be guaranteed

4.3.1 The selection standard of practical

teachers is relatively low

Teachers in higher vocational colleges are the direct participants in the practice of enterprises, and also the key to determine the implementation level of the policy. From the perspective of policy orientation, higher education administrative departments encourage professional teachers to practice in enterprises. The main purpose is to improve the practical teaching ability of professional teachers in higher vocational colleges and make up for the short board of low skill level of professional teachers in higher vocational colleges. However, in terms of actual implementation, it is not ideal. In higher vocational colleges, the ratio of students to teachers is generally high, so it is difficult to select the enterprise practice objects strictly according to the professional needs and teachers' needs. One teacher stated that, 'The source of students is the lifeline of a school. The enrollment of higher vocational colleges is not as stable as undergraduate colleges. As long as students want to enter, we will try our best to recruit them. For example, we have recruited 200 more students this year, and the number of students has increased by 40%, but the number of teachers cannot be increased by 20 at once, so the ratio of students to teachers will be more tense. Therefore, fewer professional teachers would have the opportunity to practice in enterprises'(B-4). In this case, teachers who have not been strictly selected come to the enterprise only to complete the task of enterprise practice arranged by the school, rather than thinking of enterprise practice from the heart, and even some professional mismatches appear.

4.3.2 The practice process is not deep enough

The important significance of professional teachers' practice in higher vocational colleges lies in accumulating work experience through enterprise post practice, and gradually absorbing and internalizing the experience in the process of actual participation, so as to master the tacit knowledge needed for practice teaching. Without this kind of enterprise practice, it will be very difficult to obtain real working experience only relying on theoretical study. However, from the reality of the enterprise practice of professional teachers in higher vocational colleges, it is still common for teachers to accumulate corresponding experience and obtain tacit knowledge. As summarized by one teacher, 'The real growth of enterprise practice under the teacher is certainly not a short time to achieve, because experience needs to be accumulated. At the beginning, we can only learn from a simple point of view. We must work closely with the enterprise for two or three years, then we can really be competent for the work of the enterprise, and finally we can help the enterprise solve some technical problems. But now, the practice of the next enterprise is to take a cursory view, and do not exercise on the actual job, just like sightseeing, temporary post, taking a form'(A-3). The main reason lies in the lack of projects in the current practice mode of teachers' enterprises, and it is difficult to guarantee the practical effect without the support of project carriers.

4.3.3 The assessment of practical teachers is not strict

For the enterprise practice of professional teachers in higher vocational colleges, the assessment management is also one of the most important links. However, both enterprises and higher vocational colleges have not played an effective role in supervision and management, so-called enterprise practice assessment is easy to become formalized. On the one hand, because enterprises do not regard the practical teachers as real employees, and will not pay them, therefore, in most cases, they will not strictly implement the assessment according to the regulations. As stated by one teacher, 'I think it is necessary to further strengthen the management, especially to explore a new assessment mechanism. Because the enterprise does not need to pay the practice teacher's salary, so it will not carry on the strict examination to the teacher, and the evaluation is easy to become a mere formality'(B-4). On the other hand, higher vocational colleges do not pay attention to the enterprise practice of professional teachers in a real sense. In the evaluation system of teachers, the proportion of enterprise practice is very limited. The enterprise practice assessment of teachers is mainly based on the summary materials and enterprise official seal, and even there is no corresponding supervision and management on whether the teachers really come to the post. As one teacher commented, 'No matter what the performance of teachers, schools usually give qualified evaluation. The premise is that teachers can get the list sealed by the enterprise. But since most of the practical enterprises are found by teachers themselves, it is not difficult to achieve this'(B-1).

5. Conclusions and Discussion

Since the new century, in order to improve the practical teaching ability of vocational education teachers and enhance their professional development level, China successively issued relevant policies. Up to 2016, the Ministry of education and other six departments officially issued the regulations on enterprise practice of

vocational school teachers. Although it is of great practical significance for vocational education teachers to practice policies in enterprises, there are still many difficulties in the implementation. Unfortunately, the existing research on the dilemma of implementing enterprise practice policy under the guidance of vocational education teachers is mainly speculative research, lacking empirical data support on the explanation of implementation dilemma. The only part of quantitative research focuses on the description of existing phenomena, while the explanation of the underlying mechanism is very limited. What's more, the existing research lacks the attention of teachers who are directly involved in enterprise practice. In view of this, this study attempts to further reveal the teachers' understanding of the practical dilemma of enterprises through in-depth interviews with 21 professional teachers from 6 higher vocational colleges in Jiangsu, Zhejiang and Shanghai.

This study finds that the factors affecting the enterprise practice dilemma of vocational education teachers can be summed up in three aspects, including the difficulty of enterprise identity integration, the obvious conflict of school enterprise role and the low quality of enterprise practice. Specifically speaking, the difficulties of enterprise identity integration are as follows: "who am I" and "who are you?", "new employees" start from "Apprentice" and face up to the differences between school and enterprise system and culture; the role conflicts of school and enterprise are as follows: off job practice is facing time difficulties; enterprise practice becomes an additional workload for teachers; it is difficult to find a point of interest combination between school and enterprise; the quality of enterprise practice is not high, due to the selection standard of practical teachers is relatively low, the practice process is not deep enough and the assessment of practical teachers is not strict.

This study further supports some viewpoints of previous studies. For example, some scholars have proposed that the enterprise practice of vocational school teachers faces the dilemma of dual identity, including the "confusion of who I am" in enterprises and the fact that enterprises do not treat teachers as apprentices (Tu and Shi 2016). For another example, from the perspective of social exchange theory, Wang (2016) put forward that there is an embarrassing situation of "positive schools, passive teachers and indifferent enterprises" in the practice of enterprises under teachers in vocational colleges. Similar findings are also found in this paper.

Compared with previous studies, the innovative findings of this study mainly include the following aspects. Firstly, the identity integration of vocational education teachers in enterprise practice also reflects the institutional and cultural differences between schools and enterprises, which may be the crux of influencing their identity integration. Second, the enterprise practice of vocational education teachers is a multi-party system engineering, short-term preferential policies may play a certain effect, but in the long run, it is bound to establish a win-win mechanism. Thirdly, as the direct participants of enterprise practice, how the enthusiasm and internal motivation of teachers affect the practice effect needs more listening from teachers.

Based on the above findings and the relationship with previous studies, this study believes that in order to improve the current policy implementation dilemma and improve the effect of vocational education teachers' enterprise practice, we need to focus on the following aspects. Firstly, while strengthening the introduction of teachers with enterprise work experience, we should improve the traditional vocational education teacher education system, especially in the pre service stage, help vocational education normal students accumulate relevant enterprise work experience, and adapt to the system and cultural differences between schools and enterprises in advance. Secondly, it is necessary to establish a normalized mechanism of vocational education teachers' enterprise practice, handle the relationship between teachers' daily teaching work and enterprise practice, help teachers reduce the role conflict between schools and enterprises, and give more preferential policies to practice teachers in enterprises, so as to reduce teachers' consideration. Thirdly, we should actively cultivate the professional development consciousness of vocational education teachers, stimulate the internal drive of enterprise practice with teachers' participation, and encourage professional teachers of higher vocational colleges to cooperate with enterprises in a team way at multiple levels to form a practical learning community including different groups.

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Vocational Leadership Paradigm: Instructional vs Innovative Models

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Abstract This study was designed to determine the constructs and to develop measurement model of innovative instructional leadership for polytechnics system in Malaysia. The study used Hallinger and Murphy model as the main underpinning theoretical framework. This study has utilized a model development approach as its research design. In the earlier stage, a modified Delphi technique was used to gather initial data regarding innovative instructional leadership. Eleven experts were selected based on their expertise and experience. They confirmed 13 constructs of innovative instructional leadership for the polytechnics system. Besides the experts, a stratified random sampling was used to select the polytechnic lecturers. A new instrument was developed which consisted of 13 constructs and 185 items and it was distributed to the lecturers in the selected polytechnics to verify the proposed constructs of the innovative instructional leadership. The results showed that the lecturers at the polytechnics disagreed that their administrators possessed the innovative instructional leadership particularly related to strategic thinking, innovative thinking and network management. In addition, the study also found that the administrators of the polytechnics have only moderate level of innovative instructional leadership for most of the constructs. The factor analysis found that only 65 items out of 185 items that are valid to measure the innovative instructional leadership in the polytechnics system in Malaysia. In conclusion, this study confirmed the importance of innovative instructional leadership in the polytechnic system in Malaysia. The usage of this model is expected to map the leadership competence of the polytechnics adminstrators.

Keywords Technical and Vocational Educational and Training (TVET), innovative instructional leadership, measurement model, modified Delphi technique, Malaysia

Introduction

Leadership is a critical aspect in an organization. Generally, leaders have to assemble a strategic plan for the staff to follow. This is a conventional leadership concept. The evolution of the leadership concept has produced several theories and leadership strategies. However, according to Owen (2011), there is no consensus regarding the definition of leadership. From a historical perspective, there had been several great leaders that portrayed varied leadership traits. A great leader may have leadership traits of Genghis Khan, Nelson Mandela or Niccolo Machiavelli. Genghis Khan was very shrewd in terms of war strategies that he had conquered a huge part of Asia, including China, Persia and Mongolia. Nelson Mandela was famous for being a leader who fought for independence through anti-apartheid activities which ended the white minority regime and discrimination toward black people in South Africa (Zoll, 2012). Whereas Machiavelli was renowned for his political theory in retaining ruling powers (Avolio & Gardner, 2005).   It seems that these leaders have one thing in common:

innovative thinking.

Innovative theory was coined by Joseph Schumpeter in the early 20th century. He was an economic and political thinker. He believed that innovation is the key to economic development. He also theorized a new innovative action would replace an old innovation as a creative destruction process where innovative development cannot be avoided for economic continuity. Therefore, an investment in innovation is critical to generate economic development (Schumpeter, 1942). Romer stated that ideas and technological discoveries are the driving engines of economic growth (Wysocki, 1997). According to Bennis, Spreitzer, Cummings and Corsini (2001), to instill an innovative culture, leaders need to reward employees who contributed new ideas. Future competitions depend on who is able to create a new and innovative idea. A proactive, innovative and competitive leader is highly needed in the era of globalization (Mustapha, 2013). Globalization is a phenomenon where companies and organizations are competing to create successes or they will be left behind. (Jack, 2018). The presence of digital technology has catalyzed globalization changes (Castillo & Hallinger, 2017). Rapid changes in world economy in the era of globalization have forced leaders to be competitive and innovative in order to survive.

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BACKGROUND OF THE STUDY

Technical and Vocational Education and Training (TVET) plays a vital role in economic development of a nation (Mustapha, 2013; 2017). In some countries like Germany, TVET has known to produce competitive and skilled workers. Based on the New Economic Model (NEM), the Malaysian government has underlined the importance of developing and maintaining world-class talent for Malaysia to become a high income country. Hence, the government is trying to mainstream TVET as one of the preferred choices of the education system. However, TVET still has a negative image among parents and students where the majority of parents preferred academic track for their children.

In Malaysia, each year, about 100,000 secondary school leavers enter the job market without any formal skills training. Based on the labor statistics, only 23% of the Malaysian workforce comprised skilled workers. This percentage is much lower as compared to other developed countries. Malaysia hopes to increase the proportion of highly skilled workers to 35% by 2020 (Mustapha, 2013; 2017). According to Ilies, Morgeson and Nahrgang (2005), TVET is an educational system that provides specialized training to increase the number of skilled workers. In addition, UNESCO-UNEVOC has outlined three main themes to sustain TVET: (a) fostering youth employment and entrepreneurship, (b) promoting equity and gender equality, and (c) facilitating the transition to green economies and sustainable development. Although several strategies have been carried out there are still significant weaknesses in the TVET system including the polytechnic system. Past research has shown that polytechnic administrators still practice conventional leadership without inserting creative and innovative elements in their organizational management (Rasul et al., 2015). Despite modern leadership theories and models, in this research, the researchers have decided to examine the Instructional and Innovative Leadership (IIL) among Malaysian polytechnics leaders as a core investigation in this research. Polytechnics were selected because they were involved with the teaching and learning process but mainly in the traditional way. Therefore, it is critical to develop an innovative instructional TVET leadership model for the polytechnic system.

METHODS

Research design has two aims that are to prepare answers to research questions and to control variables (Chua, 2009; Kahn, 2006). Model development is the main research design used in this study. According to

Richey and Klein (2007), model development is a systematic study of design, development and evaluation processes with the aim of establishing an empirical basis for a creation of an instructional or non-instructional model, tool, or product. In this study, the researchers used model development design to construct a measurement model of innovative instructional TVET leadership. Besides model development design, this study also employed modified Delphi technique to obtain relevant constructs for the model.

In the first phase, this research used the modified Delphi technique to obtain experts' opinion regarding the initial constructs for the innovative instructional leadership. The modified Delphi is a cycle series technique based on experts' agreement to confirm relevant constructs (Keeney, Hasson, & McKenna, 2011). To select the constructs and to develop the items regarding the innovative instructional leadership in Malaysian polytechnic system, the researchers used the modified Delphi technique. Skulmoski et al. (2007) and Keeney, Hasson and McKenna (2011) stated that this technique is suitable for exploring and confirming the relevant constructs based on the experts' perception. According to Loo (2002) and Manley and Zinser (2012), using modified Delphi technique, a strong agreement among the experts is required to confirm the constructs.

The confirmed constructs from the modified Delphi panel of experts were used to develop the items for the instrument. A set of questionnaires was constructed based on the Delphi's input. The constructs were tested and verified in several rounds before they were incorporated in the instrument. Then, the instrument was validated in a pilot study before it was administered to target respondents who were the administrators and lecturers at the five polytechnics in Malaysia.

Research procedure

This study comprised four phases. Figure 1 showed the executing procedure of those phases. The first phase involved the construct definition process that covered the determination, development and purification of the constructs. This stage was critical in ensuring that only valid constructs can be included in the research. Initial constructs were derived from an extensive literature review and refined to be included in the modified Delphi technique. The second phase was research design. Researchers have selected the research design, population and sample, data collection and data analysis methods. The third phase involved process of determining the compatibility of the measurement model. Based on the empirical data that were collected using the
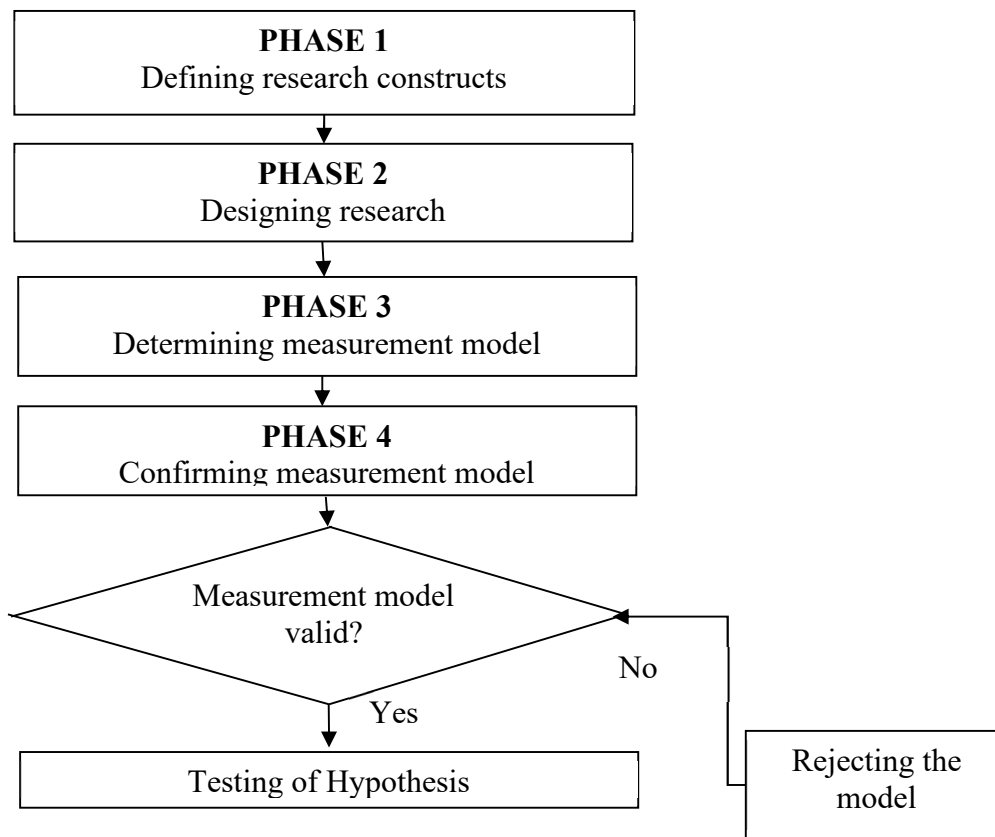
Figure 1: Research procedure

research instrument, the measurement model would be developed and tested. It also involved the determining of relationship between latent and observed variables. In the fourth phase, the validity assessment of measurement model was tested using convergent, discriminant and nomological validity.

Phase 1: Defining constructs

Defining the research constructs was the first step in ensuring the chosen constructs were appropriate and matched the research objectives.

Phase 2: Designing research

This phase involved the research design process. Decision about Delphi panel and rounds, population and sample, instrumentation, data collection and data analysis was finalized in this stage.

Phase 3: Determining measurement model

Measurement model was formed by measuring the relationship between latent and indicator variables and

variant errors. Compatibility of measurement model with the research data was important to show the credibility of the model. If the measurement model was not compatible with the research data then the model was not valid. Hence, the first step in the Confirmatory Factor Analysis (CFA) was to determine the compatibility of the constructs in the measurement model. The results of CFA showed the credibility of the indicator variables to represent the latent variables in the measurement model. In other words, if the confirmatory factor analysis result showed that the items did not represent the resilient latent variables then the measurement model was not valid. Since the indicator variables were formed from the questionnaire items, researchers needed to ensure that those items have a high credibility because an item that has a low credibility would affect the decision-making based on the measurement model. Therefore, the result of CFA's credibility was very critical.

Confirmatory Factor Analysis (CFA) was carried out using *Analysis of Moment Structure* (AMOS) version 20. This analysis was designed to determine the

suitability of 13 constructs that were developed to determine the innovative instructional leadership among polytechnic leaders. All items loaded in the CFA measurement model need to show convergent validity (Hair et al., 2010). Three indicators were used to evaluate the convergent validity which was based on the weighting factor value (λ) more than >0.50 (Hair et al., 2010), extracted average variant value of each construct ≥ 0.50 (Hair et al., 2010), and the credible construct value > 0.60 (Hair et al., 2010). In addition, comparability (good fit) between construct and research data was determined based on the combination of at least one *Absolute Fit Indices* and one *Incremental Fit Indices* (Brown, 2012; Hair et al., 2010).

Phase 4: Confirming measurement model

To confirm a model, the validity of constructs and items is critical. This means that the validity of construct is an index of the accuracy of the measurement model. Constructs that reach an acceptable level of validity indicate that the measuring items obtained from research sample truly described the traits that exists in a population. There are three forms of construct validity ─ convergent, discriminant and nomological validity. Convergent validity shows how the items for a construct in general can contribute to a number of variants for that particular construct (Hair et al., 2010). There are three

methods to measure convergent validity through: (a) determination of standard weighting factor value, (b) extracted average variant and (c) credibility of construct (De Jong & den Hartog, 2010; Hair et al., 2010).

A discriminant validity shows a uniqueness of a particular construct. A discriminant validity indicator shows to what extent that a particular construct is different from the other constructs (Brown, 2012; Hair et al., 2010). There are two methods to measure discriminant validity. The first method is to make a comparison between the average value of extracted variants (AVE) and the construct that has a squared correlation value (r^2) (De Jong & den Hartog, 2010; Hair et al., 2010). The squared correlation value is obtained from the two constructs. To fulfill the requirement of the discriminant validity between constructs, the AVE value needs to be larger than the squared correlation value (Brown, 2012). The determining method for discriminant validity is also used for the measurement model. The second method to determine discriminant validity is when there are no cross loadings between observation variables and errors (Hair et al., 2010). Nomological validity is conducted to determine the level of relationship between the constructs that have been accurately tested whether each construct is according to theoretical forecast or backed up literature (Hair et al., 2010)

Table 1: Constructs identification

Number	Constructs before the Interview	Constructs after the Interview
1)	Setting vision and mission	Setting vision and mission
2)	Providing necessities	Providing necessities
3)	Showing concerns	Showing concerns
4)	Projecting self-personality	Projecting self-personality
5)	Creating conducive environment	Creating conducive environment
6)	Managing educational management functions	Managing educational management functions
7)	Building team work	Building team work
8)	Promoting academic climate of learning	Promoting academic climate of learning
9)	Organizing talents/abilities	Organizing talents/abilities
10)	Monitoring teaching and learning process	Monitoring teaching and learning process
11)	Having strategic thinking	Having strategic thinking
12)	Having innovative thinking	Having innovative thinking
13)	Building networking	Building Networking
14)	Conducting class supervision	Not chosen by experts
15)	Using effective pedagogical strategies	Not chosen by experts
16)	Showing endurance	Not chosen by experts
17)	Managing changes	Not chosen by experts

ticular construct (Hair et al., 2010). There are three

RESULTS

To identify the relevant constructs, the researchers have reviewed extensively the literature including the past research related to innovative instructional leadership. Next, an interview protocol was developed for the Delphi experts and it went through the validation process by three experts as well as the declaration form was distributed to the Delphi experts. The Delphi panel consisted of 11 experts and they were selected based on specific criteria. After the interviews with the 11 experts were completed in the first round, the list of constructs was drafted. The experts were in agreement that only 13 out of the following 17 constructs were suitable. The construct before the interview (17 constructs) and after the interview (13 constructs) are displayed in Table 1.

For the second, third and fourth rounds ─ the consensus for the 13 constructs was gained from the Delphi experts. Median and range between quartiles (IQR) were used as indexes for experts' agreement. The median values of 4 and 5 showed the agreement among expertise toward the constructs while IQR that showed the values of 0 and 1 indicated the unanimous decision of experts toward the constructs. Table 2 illustrated the summary of findings on expert agreement for the second, third and fourth rounds.

Based on the findings of the modified Delphi technique, the measurement model research consisted of 13 constructs of innovative instructional leadership items (IIL). Based on several rounds of testing, CFA confirmed that only 65 items out of 185 items that are relevant in the new innovative instructional leadership model (see Tables 4 and 5). In the nutshell, this study confirmed the importance of innovative instructional leadership in the polytechnic system in Malaysia.

Figure 2 showed the items and the constructs that have reached a good comparability level. Analysis model in Table 5 shows that the model formed have reached a good comparability level based on the fixed indicators such as CMIN/DF, CFI, and RMSEA (CMIN/DF=3.25, CFI=0.96 and RMSEA=0.06). This

Table 2: Experts agreement on the constructs

No	Round \\ Construct	Second	Third	Fourth
1)	Setting vision and mission	11	9	9
2)	Providing necessities	13	13	13
3)	Showing concerns	11	11	11
4)	Projecting self-personality	12	12	12
5)	Creating conducive environment	16	16	16
6)	Managing educational management functions	16	16	16
7)	Building teamwork	16	16	16
8)	Promoting academic climate of learning	15	16	16
9)	Organizing talents/ability	17	17	17
10)	Monitoring teaching and learning process	12	12	12
11)	Having strategic thinking	18	18	18
12)	Having innovative thinking	11	11	11
13)	Building networking	17	21	21

Table 3: Summary of constructs and items used in the CFA

Symbol	Explanation
1	Strategic thinking construct
2	Innovative thinking construct
3	Strategic management construct
4	Setting vision and mission construct
5	Providing necessities construct
6	Concerns construct element
7	Self-personality construct
8	Creating conducive environment construct
9	Organizing educational management functions construct
10	Team work construct
11	Promoting academic climate of learning construct
12	Organizing ability construct
13	Monitoring teaching and learning process construct
i1-i8	Strategic thinking items
i11-i22	Innovative thinking items
i29-i33	Network construction items
i36-i42	Self-personality items
i49-i61	Creating conducive environment items
i70-i75	Organizing educational management functions items
i79-i82	Team work items
i100-i103	Promoting the academic climate of learning items
i120-i125	Organizing ability items
i131-i135	Monitoring teaching and learning process items
i148-i152	Strategic thinking items
i157-i160	Innovative thinking items
i172-i185	Networking construction items

gives the justification that the data matched the measurement model that has been hypothesized in Table 5.

Validity evaluation of the constructs

Table 6 illustrated the weighting factor values. The highest credibility can be seen in item number 73 in the education management construct with the value of 0.93. In general, all items have a high weighting factor values ranging from 0.73-0.93. Therefore, they adhere the internal credibility value of ≥ 0.7. Next, for convergence validity, all items have high significant levels that satisfy the AVE value of 0.5 or higher for each construct. Lastly is CR which is the composite credibility value which satisfies the value of ≥ 0.6 for each construct. The values satisfy the criteria set by Hair et al. (2009) and Bentler and Yuan (2000). The second level of innovative instructional leadership CFA model in Figure 2 also shows that IIL constructs have a discriminant validity where there is no item that is cross-loading or is redundant with other items (Hair et al. 2010). This shows that all items

contained in these constructs can be unidimensionally measured, thus, they are valid and credible. In brief, this model has a good fit in terms of convergent validity, discriminant, and a good composite credibility. The decision is based on the overall findings of the measurement model as posited in Tables 5 and 6.

DISCUSSION AND IMPLICATIONS

The modified Delphi technique provided a platform for the experts to confirm the proposed constructs. The key strength in modified Delhi technique lies in its ability to obtain opinions and to reach consensus among a panel of experts in several rounds. Hence, this technique is a flexible research technique well suited when there is incomplete knowledge about a phenomenon. Defining the research constructs was the first step in ensuring the constructs were appropriate and matched the research objectives. Next, the researchers selected the Delphi experts based on the specific criteria. The measurement model was formed by measuring the relationship
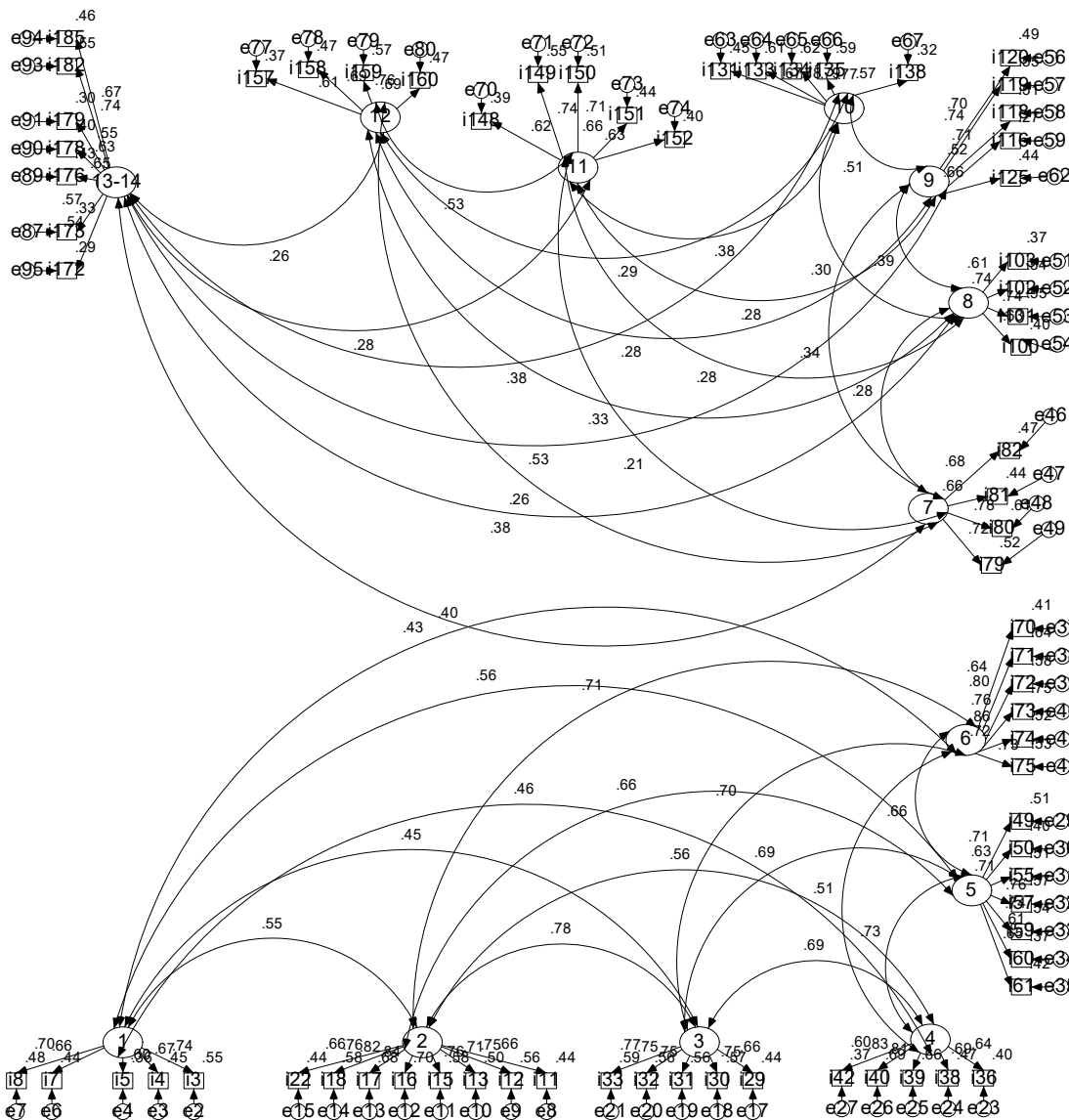
Figure 2: Confirmatory factor analysis (CFA) measurement model for innovative instructional leadership (IIL)

between latent and indicator variables and variant errors. Compatibility of measurement model with research data was important to show the credibility of the model. If the measurement model was not compatible with the research data then the model was not valid. Hence, the first step in the Confirmatory Factor Analysis (CFA) was to determine the compatibility of the constructs in the measurement model. The results of CFA showed the credibility of the indicator variables to represent the latent variables in the measurement model. In other words, if the confirmatory factor analysis result showed that the

items did not represent the resilient latent variables then the measurement model was not valid. Since the indicator variables were formed from the questionnaire items, researchers needed to ensure that those items have a high credibility because an item that has a low credibility would affect the decision-making based on the measurement model. Therefore, the result of CFA's credibility was very critical.

Confirmatory Factor Analysis (CFA) was carried out using *Analysis of Moment Structure* (AMOS) version 20. This analysis was designed to determine the

Table 4: Overall good fit measurement model of each construct of IIL

No.	Construct	CFI ≥ 0.9	RMSEA ≤ 0.08	CMIN/df < 5.0	GFI ≥ 0.9
1.	Setting vision and mission	0.99	0.01	1.07	0.99
2.	Providing necessities	0.96	0.08	4.45	0.95
3.	Showing concerns	0.98	0.08	4.99	0.98
4.	Projecting self-personality	0.99	0.06	3.26	0.99
5.	Creating conducive environment	0.97	0.08	4.46	0.96
6.	Organizing educational management functions	0.98	0.07	4.73	0.98
7.	Building team work	0.94	0.04	1.81	0.99
8.	Promoting academic climate of learning	0.99	0.08	4.43	0.99
9.	Ability to organize	0.95	0.03	4.40	
10.	Monitoring teaching and learning process	0.98	0.07	4.06	0.99
11.	Strategic thinking	0.94	0.07	3.99	0.99
12.	Innovative thinking	0.95	0.04	1.71	0.99
13.	Networking construction	0.92	0.01	1.11	0.99

suitability of 13 constructs that were developed to determine the innovative instructional leadership among polytechnic administrators. All items loaded in the CFA measurement model need to show convergent validity (Hair et al., 2010). Three indicators were used to evaluate the convergent validity which was based on the weighting factor value (λ) more than >0.50 (Hair et al., 2010), extracted average variant value of each construct ≥ 0.50 (Hair et al., 2010), and the credible construct value > 0.60 (Hair et al., 2010). In addition, comparability (good fit) between construct and research data was determined based on the combination of at least one *Absolute Fit Indices* and one *Incremental Fit Indices* (Brown, 2012; Hair et al., 2010).

In addition, the CFA conducted on 13 constructs has confirmed 65 out of 185 items that are pertinent in the new model of innovative instructional leadership (IIL) for the polytechnic system in Malaysia. The descriptive analysis used means, median, standard deviation, and quartile between ranges (IQR) to obtain concerted agreement among the 11 experts. Confirmatory Factor Analysis was carried out to determine the Instructional Innovation Leadership (IIL) measurement model based on the survey data consisted of 575 respondents. In CFA, a fit of indices measurement model was achieved with the values of CMIN/DF=3.25, CFI=0.96 and RMSEA=0.06. The data have supported the previous models used in this study such Hallinger and Murphy (1985), Liedtka (1990), Murphy (1990), Moss and Jerome (1994), McEwan (1998) and NASSP (2001).

Table 5: Overall good fit of CFA IIL constructs

	Hypothesized measurement model	Recommended values	Sources
CMIN/df	3.25	≤ 5.00	Hair et al. (2006); McGrath (2011)
CFI	0.96	≥ 0.90	Hair et al. (2006); McGrath (2011); Brown (2012);
RMSEA	0.06	≤ 0.08	Browne & Cudeck (1993); Hair et al. (2006); McGrath (2011)

Table 6: Construct validity evaluation

No.	Construct	Item	λ (KC) ≥ 0.7	AVE ≥ 0.5	pc / CR ≥ 0.6
1.	Vision and mission	I4	0.79	0.66	0.89
		I5	0.78		
		I7	0.88		
		I8	0.80		
2.	Infrastructure	I11	0.75	0.56	0.91
		I12	0.73		
		I13	0.78		
		I15	0.77		
		I16	0.86		
		I17	0.84		
		I18	0.76		
		I22	0.65		
3.	Concerns	I29	0.81	0.74	0.93
		I30	0.87		
		I31	0.86		
		I32	0.86		
		I33	0.88		
4.	Self-personality	I36	0.70	0.71	0.93
		I38	0.84		
		I39	0.88		
		I40	0.93		
		I42	0.78		
5.	Conducive environment	I49	0.84	0.69	0.94
		I50	0.78		
		I55	0.83		
		I57	0.88		
		I59	0.88		
		I60	0.76		
		I61	0.82		
6.	Educational management	I70	0.80	0.75	0.95
		I71	0.90		
		I72	0.88		
		I73	0.93		
		I74	0.85		
		I75	0.85		
7.	Team work	I79	0.84	0.71	0.91
		I80	0.89		
		I81	0.82		
		I82	0.83		
8.	Learning climate	I100	0.79	0.68	0.90
		I101	0.88		
		I102	0.86		
		I103	0.78		
9.	Ability to organize	I118	0.84	0.71	0.91
		I119	0.89		
		I120	0.82		
		I125	0.80		
10.	Monitoring teaching and learning process	I131	0.83	0.76	0.93
		I133	0.90		
		I134	0.89		
		I135	0.87		
11.	Strategic thinking	I148	0.78	0.68	0.91
		I149	0.85		
		I150	0.86		
		I151	0.82		
		I152	0.79		
12.	Innovative thinking	I157	0.78	0.69	0.90
		I158	0.84		
		I159	0.86		
		I160	0.84		
13.	Network construction	I176	0.75	0.54	0.80
		I178	0.72		
		I179	0.80		
		I182	0.73		
		I185	0.80		

Note: λ = Weighting factor (Cronbach Coefficient) (KC), CR = AVE Credibility Composite = Average Variance Extracted

CONCLUSION

The research on innovative instructional leadership (IIL) was conducted because the lack of measuring model of IIL in Malaysian polytechnic system. This study has utilized a model development approach as its research design. In the first phase, a modified Delphi technique was used to gather initial data regarding the relevant constructs of innovative instructional leadership. Eleven experts were selected based on their expertise and experience. They confirmed the 13 constructs of innovative instructional leadership for the polytechnics system. Based on the 13 constructs, a total of 185 items was developed and distributed to the respondents in the selected polytechnics to determine the innovative instructional leadership of polytechnic administrators. Empirical data collected were analyzed using descriptive and inferential statistics such as means, standard deviation, correlation and confirmatory factor analysis. The alarming result showed that lecturers at the polytechnics disagreed that their administrators possessed the innovative instructional leadership particularly related to strategic thinking, innovative thinking and network management. In addition, the study also found that the administrators of the polytechnics have only moderate level of innovative instructional leadership for most of the constructs. Based on confirmatory factor analysis, it was found that only 65 items out of 185 items that are important in the new model of the innovative instructional leadership in the polytechnics system in Malaysia. The main implication of this study is that the new innovative instructional leadership measurement model could be used to measure competency and professionalism of leaders in polytechnics and other TVET institutions.

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The Research on the Effectiveness of Culinary Techniques Learning for the Students in the Department of Culinary Arts

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Abstract The main purpose of this research was to understand the learning effectiveness of the students in the department of culinary arts in the culinary operation process, and to explore the correlation between the students' learning effectiveness and culinary techniques, and the influence of the learning process on the culinary techniques. The quasi-experimental design was employed in this research. The total of 20 students from the students in the department of culinary arts were invited as participants with the experimental duration of 15 weeks. The data of learning effectiveness collected was analyzed with SPSS 20.0 package software, including descriptive statistics, item analysis, factor analysis, reliability and validity analysis, t-test, and Analysis of Variance, ANOVA. The findings of this research were as followings: The total of 12 culinary techniques were categorized 3 types of factors: 1. The 6 sub-tests were included with slices, fried, oyster sauce, crushed, chunks, and shred. 2. The 3 sub-tests were included with pan-fried, wok-fried, and braised. 3. The 3 sub-tests were included with pepper flavor, steaming, and sweet and sour flavor. Moreover, the factor loading coefficients of each subtest and factor were between 0.666 and 0.712, indicating that the relational aggregation between each subtest and factor was in good condition. The results of this factor analysis showed that the cumulative total interpretation, 71.284% (over 50%), and the factor loading was greater than 0.5, which had the preliminary construct validity and the test construction content corresponded with the theoretical construction of Chinese cuisine cooking techniques. Based on the research results, the further relevant teaching and research suggestions would put forward. The benefits of culinary techniques teaching and research would be expected in the future as well.

Keywords Culinary Arts Department, Learning Effectiveness, Culinary Techniques, Techniques Learning, Practical Techniques

I. Introduction

The profession of "Chef" is an affirmation given by the society. It attracts countless young people with passion every year. Culinary education has generally continued to grow throughout the world. There are more than 700 related culinary education and training programs or institutions in the United States. (Reinhart, 2002). The catering and culinary related departments of the domestic technical vocational system in Taiwan follows the national policy to train the fundamental projects of culinary education to train students to obtain culinary-related certificates. According to the 2010 Survey on

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Employment of Freshmen in the Workplace published by the Vocational Training Bureau of the Labor Committee of the Executive Yuan (2010), in the questions, "What efforts have you made to increase your competitiveness in job hunting?" The response, "Get a license to strengthen the strength" was ranked as second (57.71%) and that was to meet the needs of the licensed kitchen industry as a whole. Therefore, most schools take promoting students to obtain technical licenses as the teaching goal, and make practical courses into training courses for verification subjects, resulting in standardization of course content.

The stage of the chef is in the kitchen. The kitchen is the place to show the cooking skills. The proficiency of the cooking skills is cultivated through the accumulation of time. Therefore, the fundamental skills and theories of the culinary arts play an important role in the academic field and the real catering industry. What we pay attention to is efficiency. Only by creating performance can we operate continuously. Under the pressure of graduation threshold, catering students must strive to learn the professional skills of culinary arts, and obtain certificates as the ultimate goal of learning effectiveness.

The three objectives of this research are as followings:

1. Understand the current situation of culinary art students receiving guidance on culinary skills and

learning effectiveness.

2. Understand that students' learning effectiveness to fit in the theoretical construction of Chinese cooking skills.

3. Explore the significant differences in the effectiveness of students' learning of cooking techniques.

II. Literature Review

In the catering technical vocational system, students' professional skills course learning is to actively promote the learning experience through teacher-student interaction (Dwyer & Stufflebeam, 1996), and the process-oriented learning is turned to student-centered, focusing on its learning effectiveness and growth process (Smith & Cooper, 2000). Therefore, in the case of getting more students, teachers' instruction and students' learning conditions are even more important (Hou Zongmin, 2018). The learning process of culinary skills is an overall planned and systematic linking action. Before the skill of knife and cooking skills has not reached the proficiency stage, a series of culinary education and training activities must be planned to obtain or strengthen the culinary skills with accumulated experience in operating ability. The overall skill of culinary art requires a period of time, repeated correct practice and tends to be fixed to achieve zero defects in culinary art works. This is the most critical stage in the skill learning to truly practice makes perfect.

2.1 Culinary Techniques

The most relevant course for catering education is the "cooking course", which is a chef education and training program. (Yang Zhaojing, Zhao Yimeng, 2002) Students must first understand the operation process of the knife technique before they take the cooking course so that they can follow the cooking technique in order. Finally, they can decide the seasoning technique of a dish. The completion of these three processes is the so-called " Cooking Techniques."

After each technique is demonstrated by the technical teacher, students will be confused and anxious from the basic operation to the advanced technique. For this reason, Rowan (2003) and Yeh (2004) believe that through good teacher-student interaction, appropriate teaching strategies and supportive learning environment and other factors can stimulate students' learning motivation potential.

Peer discussion and sharing can also help to stimulate more innovated ideas (Horng & Lee, 2006), so that the process of learning culinary skills is no longer a closed-door struggle. The hard journey also increases

one's self-confidence and energy. After graduation, it can increase employment opportunities and reach their achievement with positive confirmation. (Kang Mingzhong et al., 2010)

2.2 Learning Effectiveness

Learning effectiveness refers to the behavioral ability and reaction of learners after experiencing the teaching and learning process.

Ying (Hsieh, 2016). The purpose of this research is to tutor students in fundamental culinary skills, and to evaluate their learning effectiveness. The method of practical evaluation was adopted by experts with 5 level of ranking, (5- means very good; 4- means very good; 3- means ordinary; 2- means not good; 1- means very bad), the ultimate goal of this course is to obtain a Chinese food certificate.

III. Research Method

3.1 Research Framework

This research adopts a single-group post-test design of the quasi-experimental research method, because the participants are all novice students, assuming that their preparatory behaviors are equal, and only implement post-test employed after the teaching process to evaluate the learning effectiveness. The research framework is shown in Figure 1.

3.2 Research Hypothesis

According to research purposes, three research hypotheses are proposed.

Research hypothesis 1-1: There are significant differences in the "Knife Techniques" in the culinary techniques of tutoring students.

Research Hypothesis 1-2: There are significant differences in the " Cooking Techniques " in the culinary techniques of tutoring students.

Research hypothesis 1-3: There are significant differences in the " Seasoning Techniques " in the culinary techniques of tutoring students.

3.3 Research Participants

The research participants are selected from the freshmen in the Department of Culinary Arts in TransWorld University, Taiwan. The interdisciplinary students have no culinary related learning experiences. In this research, a total of 20 students were instructed with a 15-week license tutoring course based on the skill learning process of the practical course. Because the
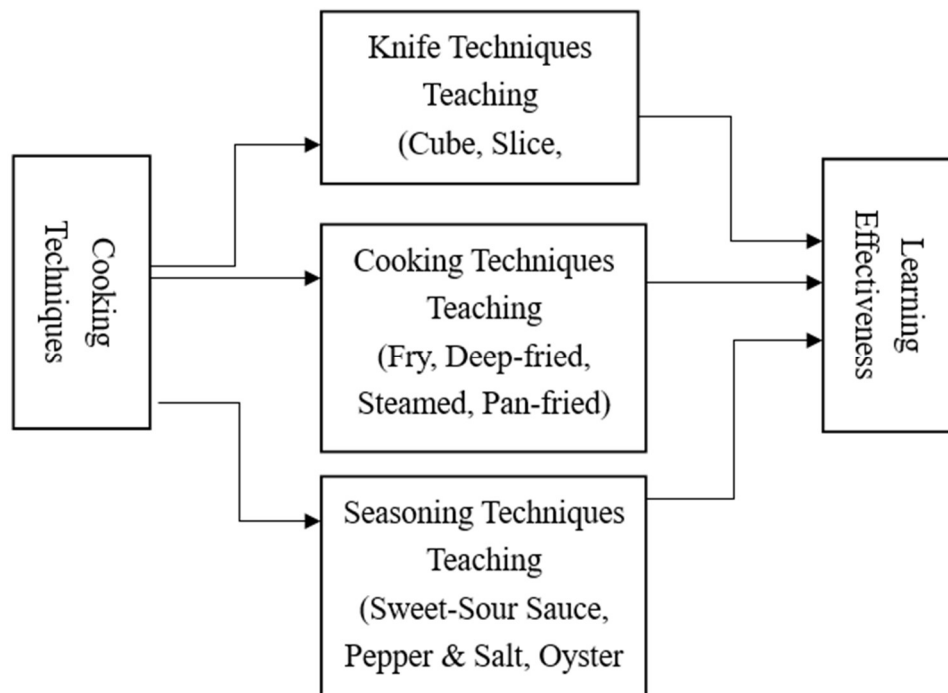
Figure 1 Framework diagram of student culinary techniques learning effectiveness

participants are all novice students, assuming that their preparatory behaviors are equal, post-tests are only implemented after the teaching process to evaluate the effectiveness of learning.

3.4 Research Instruments

The compilation of this research instruments mainly refers to the research of Wu Shuzhen and Li Yongyin (2007)- *Development of the Efficiency Learning Scale for College Students.* Based on Wu and Li's research, the culinary technique design and learning effectiveness evaluation scale was developed to meet the needs of this research. After the 15-week course, student's performances were scored based on this evaluation scale.

3.5 Reliability Analysis of Research Instruments

There is a total of 12 questionnaires in this research. The reliability of each questionnaire uses Cronbach's internal consistency to test whether the content of the items is consistent and stable. Guilford (1965) recommends its reliability when the value of α is greater than 0.7, it indicates high reliability. Therefore, this research adopted the standard of Cronbach's $α \geqq 0.7$ to analyze the reliability of the scoring scale (Table 1). The score sheet of Knife Techniques includes four parts: Cube, Slice, Julienne, Chopped. The score sheet of Cooking

Table 1 Research Reliability Analysis

	Items	Cronbach's α
Knife Techniques Score Sheet	4	.937
Cooking Techniques score sheet	4	.813
Seasoning Techniques score sheet	4	.826

Techniques includes four parts: Fry, Deep-fried, Steamed, Pan-fried. The score sheet of Seasoning Techniques includes four parts: Sweet-Sour Sauce, Pepper & Salt, Oyster Sauce, Soy Sauce

3.6 Validity Analysis of Research

Instruments

Table 1 shows that the Kaiser-Meyer-Olkin of Sampling Adequacy (KMO) reaches .710 for the Knife Techniques, Cooking Techniques, Seasoning Techniques of the culinary techniques. The Bartlett's test of Sphericity

Table 2 KMO and Bartlett verification

Kaiser-Meyer-Olkin	Sampling suitability	.710
Bartlett's test of Sphericity	Approximate chi-square distribution	137.812
	df	66
	Significance	.000

*** p<.001

Table 3: The Factor Analysis of the test on Tutoring Students' Culinary Techniques

	Factor 1	Factor 2	Factor 3	Factors	Eigenvalues	Explanation of variance %	Cumulative interpretation %
Slice	.824			Skilled	4.299	35.829	35.829
Deep-fried	.824						
Oyster sauce	.809						
Chopped	.805						
Cube	.726						
Julienne	.725						
Pan-fried		.787		Skill enhancement	2.163	18.025	53.853
Fry		.712					
Soy sauce		.543					
Pepper & salt			.861	Jerky skills	2.092	17.431	71.284
Steamed			.705				
Sweet-sour sauce.			.666				

Source: compiled by this research

Table 4 Summary Table of Analysis of Variations in Learning Effectiveness of Knife Techniques

	Sum of square	Degree of freedom	Mean square	F	p value
Knife Techniques	75.117	10	7.512	17.636***	.000
Inner Group	3.833	9	.426		
Total	78.950	19			

***p<.001

Table 5 Summary Table of Analysis of Variations in Learning Effectiveness of Cooking Techniques

	Sum of square	Degree of freedom	Mean square	F	p value
Cooking Techniques	61.333	10	6.133	9.741**	.001
Inner Group	5.667	9	.630		
Total	67.000	19			

**p<.01

is 137.812 (p) <0.001), indicating that the scale has significant correlation coefficients and is suitable for factor analysis (Table 2).

The factor analysis results and naming of the culinary techniques learning effectiveness scale are shown in Table 3.

3.6-1 The statistical results of the factor analysis of the test on tutoring students' culinary techniques are shown in Table 3.

3.6-2 The Table 3 indicates that the total of 12 culinary techniques were categorized 3 types of factors: 1. The 6 sub-tests were included with Slice, Deep-fried, Oyster Sauce, Chopped, Cube, and Julienne. The characteristic value was 4.299, and the explanatory power was 35.29%. 2.; The 2 sub-tests were included with Pan-fried, Steamed, and Sweet-sour Sauce. The characteristic value was 2.163, and the explanatory power was 18.025%. 3. The 3 sub-tests were included with Pepper & Salt, Steamed, and Sweet-sour Sauce. The characteristic value was 2.092, and the explanatory power was 17.431%. Moreover, the factor loading coefficients of each subtest and factor were between 0.666 and 0.712, indicating that the relational aggregation between each subtest and factor was in good condition.

3.6-3 The results of this factor analysis showed that the cumulative total interpretation, 71.284% (over 50%), and the factor loading was greater than 0.5, which had reached the preliminary construct validity and the test construction content corresponded with the theoretical construction of Chinese cuisine culinary techniques.

IV. Research Analysis and Discussions

The purpose of this research is to understand the analysis and discussion of the learning effectiveness of the freshmen interdisciplinary students in the Department of Culinary Arts in terms of the Knife Techniques, Cooking Techniques, Seasoning Techniques of the culinary techniques to provide teachers with planning courses and teaching for references. The research findings are discussed as followings:

4.1 The Analysis of the Variance of Students' Culinary Techniques in Learning Effectiveness

4.1-1 Analysis of the learning

effectiveness of Knife Techniques

After independent sample *F* verification analysis of the comparison of different Knife Techniques, in the Knife Techniques factor scale part, the variance analysis of factors such as Cube, Slice, Julienne and Chopped (F=17.636, p<.05) has significant difference research hypothesis 1- 1 has been supported. The students in Chopped of Knife Techniques performed the best, yet the students in Julienne of Knife Techniques performed the worst. (Chopped >Cube>Slice>Julienne). As shown in Table 4.

4.1-2 Analysis of the learning effectiveness of Cooking Techniques

After independent sample F test analysis, the comparison of different Cooking Techniques factor scale, the variance analysis of factors such as Fry, Deep-fried, and Steamed (F=9.741, p<.05) has significant differences, research hypothesis 1-2 has been supported.

The students in Fry of Cooking Techniques performed the best, yet the students in Deep-fried of Cooking Techniques performed the worst. (Fry >Steamed>Pan-fried> Deep-fried). As shown in Table 5.

4.1-3 Analysis of the learning effectiveness of Seasoning Techniques

After independent sample F test analysis, the comparison of different Seasoning Techniques factor scale, the variance analysis of factors such as Sweet-sour Sauce, Pepper & Salt, Oyster sauce, Soy Sauce (F=4.775, p<.05). Research Hypothesis has significant differences, research hypothesis 1-3 has been supported.

The students in Oyster sauce of Seasoning Techniques performed the best, yet the students in Soy Sauce of Seasoning Techniques performed the worst. (Oyster sauce > Pepper & Salt > Sweet-sour Sauce > Soy Sauce). As shown in Table 6.

4.2 Discussions of Learning Effectiveness

The aforementioned research results found that there are significant differences in the perception of tutoring students the Knife Techniques, Cooking Techniques, Seasoning Techniques of the culinary techniques. As a result of the overall project analysis, the course guidance for interdisciplinary students should be noted as follows:

4.2-1 It is easier for students to master the three techniques of cube, Chopped and Slice in the Knife Techniques, and the achievement of the works can improve the learning motivations. The Julienne in the Knife Techniques is more difficult and easier to be injured, which puts students under psychological pressure.

4.2-2 Cooking Techniques processing is the step that every student expects. Controlling temperature and heat is the basis of learning. The focus of this operation is to have a sense of accomplishment in the learning process of Fry and Pan-fried techniques, and the Deep-fried techniques are more difficult. The reason is that the high temperature of the oil will cause the oil to explode, causing students to fear and not handle the ingredients well. The Steamed technique is to control the temperature and the size of the fire. The steamed works and the process of taking them out need to be repeat practiced several times to avoid being scalded.

4.2-3 The operation process of Seasoning Techniques is the most favorite action of students, and the operation of Oyster sauce and Pepper & Salt has few problems. On the other hand, the mixing ratio of Sweet-sour Sauce and Soy Sauce process must be controlled in temperature, fire size and the color change.

4.2-4 This research is named "Practice makes perfect," which means that students have gained proficiency in learning culinary techniques; "Skill Strengthen," which means that students' culinary techniques need to be strengthened and practiced, and "Jerky skills," which means that students must be re-operated by themselves after school.

Table 6 Summary Table of Analysis of Variations in Learning Effectiveness of Seasoning Techniques

	Sum of square	Degree of freedom	Mean square	F	p value
Seasoning Techniques	52.167	10	5.217	4.775*	.014
Inner Group	9.833	9	1.093		
Total	62.000	19			

*p<.05

Table 7 Summary table of research hypotheses and empirical results

Research hypothesis	Validation results
1-1: There is a significant difference in the " Knife Techniques " in tutoring students	valid
1-2: There is a significant difference in the " Cooking Techniques" in tutoring students	valid
1-3: There are significant differences in the " Seasoning Techniques " in tutoring students	valid

V. Research Conclusions and Recommendations

5.1 The interdisciplinary students in the Department of Culinary Arts showed their interest in culinary arts, which can be clearly seen from the 15-week tutoring course. Students devoted themselves to practicing, received the progress and effectiveness of culinary techniques, and even their parents would make a phone call to share what the students have done at home such as diligently practice and share dishes with the family. The overall average of Culinary Techniques (4.12) shows that students can prepare to take the Chinese food C-level license examination.

5.2 The result of factor analysis of tutoring students, the cumulative total interpretation amount is 71.284%, which has reached the preliminary construction effect degree. Through data, students' learning effectiveness is divided into three stages, skilled proficient (35.829%), skill enhancement (18.025%), jerky skills (17.431%). Further improvement including the weakness of the dishes need to be examined after the practical course.

5.3. The three culinary techniques in the course, based on the data analysis, Knife Techniques (F=17.636), Cooking Techniques (F=9.741) and Seasoning Techniques (F=4.775) have significant differences. Different level of techniques could be involved in each of the technique for students to practice and the accomplishment of advanced works were expected.

5.4 According to the findings in this research, the hypothesis 1-1, 1-2, and 1-3 have been supported as shown in Table 7.

5.5 Recommendations to the student's learning effectiveness and the future curriculum guidance are as follows:

5.5-1 Establish a culinary techniques club and the experienced students can be the group leaders. The students who are behind and can be integrated in the mainstream group for the peer group learning encouragement for keeping up with the progress. Mutual care becomes a learning bridge between students, and the transfer of skills between teachers and students can also set a model. (Farh & Cheng, 2000).

5.5-2 The international freshmen students are suggested take more remedial courses to catch up with Taiwanese students, and the progress of the whole class will be expected.

5.5-3 Training students to develop appropriate logic and efficiency to achieve goals during the process of cooking work through the iterative process mode.

5.5-4 By teachers' planning and the completion of designated tasks for the students, the learners will build up the habit of self-training actively instead of passively learning.

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The Necessity of the Whole School Placement of Nutrition Teachers

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Abstract In 2016, a survey of teachers' work revealed that 57% of teachers in public junior high schools work more than 80 hours of overtime per month. Under the work style reform, the Junior High School Judge said that as a countermeasure to this problem, teachers' work "can be reduced by cooperation with nutrition teachers, support and administrative and outsourcing and specialized staff." What I paid attention to here is that the nutrition teacher is taken up as a correspondence at the time of school lunch. Originally, the nutrition teacher should be a profession established to manage the school lunch of the school where it works and to promote the food education. However, as of 2018, there are no signs that the number of nutrition teachers will improve at all. In order to investigate the cause of this, the purpose of this study was to investigate the idea of food education guidance by school presidents and nutrition teachers. Therefore, we conducted a survey of principals and nutrition teachers at 45 schools, using the Question Paper and the Interview Method. The attitude to work at the school is obvious when the school management plan is seen, and the school where the nutrition teacher is arranged is written a firm content. Especially low was the item of "individual guidance for food education guidance and education". It was also found that items with high correlation with this are "construction of teem" and "improvement of the environment of faculty and staff". Especially for food allergies, it is necessary to take necessary prior treatment such as a check and talk with parents by all faculty and staff. However, it is impossible to cope with even this if it goes from the present nutrition teacher arrangement. Education must be equal, In order to make it possible for future students to receive food education, it is urgent to have all the schools of nutrition teachers.

Keywords Work style reform , Food education , Construction of teem, Improvement of the environment of faculty and staff, All schools of nutrition teachers

1. Introduction

2016 teacher employment survey conducted by the 57% of junior high school teachers outside of these hours on Labor will generally, than 80 hours (equivalent to working over 60 hours per week) is revealed ([1]. How to prevent this in the Central Education Council reported [2]. Teachers divided Council business, which teachers work (For example, correspondence at school lunch, preparation of classes, evaluation and performance processing, preparation and operation of school events, career guidance, correspondence to children and families who need support, etc.) about the "nutrition educators, support staff, The burden in cooperation, such as clerical staff, outsourced, professional staff available ' as is (see article 1). Is that the emphasis here is cited for lunch time nutrition educators. Nutrition teacher system in law and basic law on Dietary education was delivered to the new boost in view of the importance of nutrition education, in school food education leadership at the core of. The purpose of Basic Law of dietary education "By

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establishing the basic measures of dietary matters and measures to comprehensively and systematically promote and thereby contribute to the achievement of current and future health and cultural public life and a rich and vibrant communities [3]." Accordingly, State and local governments, activities related to the promotion of food education in schools, nurseries, etc. that promotes effective, promote the growth of healthy children and healthy mental and physical future Children are the future of healthy diet support achieved and to a healthy physical and mental growth, relating to the preparation of guidelines for the promotion of food education, You need to enlighten the consciousness about the role to play in promoting the establishment of dietary guidance to faculty and leadership positions in their dietary.

However, as of 2018, there is no sign that the number of nutrition teachers will be improved at all, and it remains placed where the vacancy has come out due to retirement or job change. Moreover, the school affairs of the school are added to the work of the school nutrition staff so far, and it is the present situation that the nutrition teacher is suffering in a lot of hardships. The major bottleneck is the "placement standards for nutrition teachers and school nutrition staff." Reference 2: The 6th Meeting of the Junior High School Full School Lunch Promotion Headquarters[4]. Each municipality on staff

Item	Total	nutrition teacher	
		YES	NO
Survey of students, parents, and community	37. 7%	90. 0%	26. 0%
The goal of teaching	97. 7%	100%	97. 0%
The image of children in each grade	86. 6%	90. 0%	85. 0%
Related subjects, etc. of each grade	66. 6%	100%	55. 8%

Location of personal training	Staff room	38	Class room	1	Preparatory room	0	Other	6
Place of teaching materials research	Staff room	38	Class room	1	Preparatory room	0	Other	6
Place of teaching materials store	Staff room	38	Class room	1	Preparatory room	0	Other	6

Location of personal training	Distribution room	2	Staff room	39	Preparatory room	0	Other	3
Place of teaching materials research	Distribution room	2	Staff room	37	Preparatory room	0	Other	5
Place of teaching materials store	Distribution room	0	Staff room	33	Preparatory room	0	Other	11

as a precaution, each city or town too, supports it. However, regional differences can occur is in how municipalities can finance be survived in the not. And ask something like this does not happen, either have high expectations and the teacher of school nutrition are established is one was the 29th annual national nutrition teacher 6092, five schools in the Aichi Prefecture's 3.7 to 1, nutrition educators in 262 in Chiba Prefecture, at 4.6 per in [5]. Judging will begin with nutrition educators are not considered as a teacher in.

2. Purpose of the Research

Therefore, in order to find out why a significant increase in the number of nutrition teachers isn't seen, the school principal who supervises the school, the nutrition teacher who manages school lunch, and the school lunch chief (promoter of the guidance of the school lunch, etc.) The purpose of this study was to investigate what kind of ideas are we are conducting food education guidance.

At the same time, one of the objectives was to investigate the relationship between the university's placement of nutrition teachers, which will lead to an increase in the productive population full of health and vitality, with schools and local governments working on it.

3. Content and Duration

(1) Aichi district (Toyoake , Nisshin , and Nagakute city, Togo-town in Aichi-country) 31 elementary schools (Including 1 branch) 14 junior high schools (Including 1 branch) of school management plan emphasis on food and nutrition education and school lunch guidance Food Guidance Guide⑥"Overall Plan for Food Guidance" of the solution was examined in four perspective especially important in Yes / No. Business plan for this year was that, you copy only the necessary items.

(2) Principal in Aichi district, 45 schools and nutrition educators, food service Director for questionnaire-based survey conducted. Investigating the Aichi district, principal was carried out after requesting the precautions etc. on implementation. For nutrition educators, food service Director, principal than description, was conducted. Period, 2/21/2019-and 2/28/2019.

(3) We reported the results of the survey to the supervisors of the Board of Education in the Aichi area and conducted an interview survey on the actual conditions of the placement of nutrition teachers. Period, 3/4/2019- and 3/8/2019.

4. Proposed Items

(1) School management focuses on food and nutrition education and food guidance "survey of students, parents, and community", "guideline" "in each school year children's vision" in terms of "curriculum for each grade 4 is provided" Not listed the rating by Yes / No.

(2) Question paper, 4 by the following method. Furthermore "[7] free opinions on dietary" on, had written freely about dietary suggestions and questions by writing expressions. For other items, it was as follows.

[1] Items concerning teacher training and educational research: 3 items in four principal for the "4 teachers room, 3 classrooms, 2 preparatory room, 1 other" nutrition educators and school lunch primary appointment is "4,distribution room 3 teachers room, 2 home economics room, 1 other"

[2] Items concerning the duties of the nutrition teacher: five items 3s in the first half "4 well, 3 sometimes , 2. have a request, 1 don`t it". The second half of the two items "4 think very much, 3 think so, 2 Yes/ no, 1 don't think so at all ".

[3]Items involved in team-teaching school: "4

thinking about it, 3 sometimes 2 Yes /no, 1 don't think so at all ".

[4] Items on life expectancy: "4 think well 3 think once in a while,2 Yes/no, 1 don't think at all".

[5] Items on poverty issues: "4 think well 3 think once in a while,2 Yes/no, 1 don't think at all".

[6] Items on the training and qualifications: "4 think well 3 think once in a while,2 Yes/no, 1 don't think at all".

[7] Opinion freely regarding dietary education (description)

5. Survey Results

(1) School management focuses on food and nutrition education and food guidance is like the following.

(2) Questionnaire survey

[1] Items concerning teacher training and educational research. [2] Items related to the duties of nutrition teachers. [3] Items related to the school of the school. [4] Items related to life expectancy. [5] Items related to poverty issues. [6] Items related to training and qualifications

[2] to [6] The following Table1 and 2 show the description statistics of each item. Further, those showing the correlation of these items are Table3, 4

[2] Free Opinions on Food Education, etc.

● The education field is struggling to cope with allergies. I am not studying and don't understand the role of nutrition teacher. What are the benefits of a nutrition teacher being placed in a school when organizing a team school? (50 generation、 Head of elementary school、 No-Nutrition teacher）

● As for the life expectancy and poverty issue, the problem is too big for school education to take on, and I don't know how to touch it. (50 generation、 Head of elementary school、 Yes-Nutrition teacher)

● Although we understand the importance of food education to some extent, there are various issues such as "special subject morality", "foreign language activities and English", and "programming education", and it is difficult to work on the enhancement of food education guidance. (50 generation、 Head of elementary school、 No-Nutrition teacher)

- The proportion of nutrition teachers in each city is different, and I sometimes envy areas where food education is promoted by making use of the expertise of nutrition teachers. While there is clerical processing as a school lunch chief and the work of the homeroom teacher, it is the current situation that even nutrition guidance cannot be turned around. In recent years, it takes time to deal with allergies, and there is no time to make a notice etc. (40 generation、 Head of school lunch)

- I am busy cooking and office work in the kitchen, and I can't go to school for school lunch time, and even staff meetings and committees are absent every day. I become miserable for not being able to do my duties as an

Table 1 Descriptive statistics for each item of the principal

	Degree	Minimum value	Maximum value	Average value	Standard deviation
4. Individual guidance on food education	45	1	4	2.07	.889
5. Teaching and guidance on subjects and special activities related to food education	45	1	4	2.87	.625
6. Collaboration and coordination of educational guidance on food education	45	1	4	2.71	.727
7. Management of school lunch	45	2	4	2.98	.723
8. Integrated food guidance and school lunch management	45	1	4	2.47	.726
9. Construction of rice system based on the expertise of food education guidance	45	1	4	2.27	.654
10. Strengthening school management functions for food education guidance	45	1	4	2.38	.716
11. Improvement of the environment for faculty and staff in food education guidance	45	1	4	2.27	.688
12. Efforts to develop food education related to improving life expectancy	45	1	3	2.36	.609
13. Food Education For Problem Solving Poverty Problems	45	1	4	2.49	.589
14. Initiatives concerning the license qualification of nutrition teachers	45	1	3	2.56	.546

original nutrition teacher. (50 generation、
Nutrition teacher、 Elementary school)
The following opinions were 33 principals, 16 nu-
trition teachers and school lunch chiefs, and a total of 49
schools.

- I would like to make use of the expertise of
nutrition teachers: 28 schools
- The school is seeking nutritional guidance,

but there is also work at the school lunch cen-
ter, and it has not been able to respond suffi-
ciently to the request of the school: 26 schools
- Food Allergy Problems： 17 schools
- Because of the busy revision of the new

Table 2 Descriptive statistics for Nutrition teacher and head of school lunch

	Degree	Minimum value	Maximum value	Average value	Standard deviation
4. Individual guidance on food education	44	1	3	1.84	.888
5. Teaching and guidance on subjects and special activities related to food education	44	1	4	2.05	.963
6. Collaboration and coordination of educational guidance on food education	44	1	4	2.39	.868
7. Management of school lunch	43	1	4	2.65	.870
8. Integrated food guidance and school lunch management	43	1	4	2.40	.728
9. Construction of rice system based on the expertise of food education guidance	44	1	4	2.43	.695
10. Strengthening school management functions for food education guidance	44	1	4	2.39	.689
11. Improvement of the environment for faculty and staff in food education guidance	44	1	3	2.27	.499
12. Efforts to develop food education related to improving life expectancy	44	1	4	2.30	.978
13. Food Education For Problem Solving Poverty Problems	44	1	4	2.34	.713
14. Initiatives concerning the license qualification of nutrition teachers	44	1	4	2.68	.829

Table 3 Correlation of each item of the principal

Q	4.	5.	6.	7.	8.	9.	10	11	12	13	14
4.	—	.221	.206	.108	.378*	.399**	.174	.416**	.249	.153	.343*
5.		—	.663***	.144	.491**	.311*	.115	.137	.350*	.313*	.111
6.			—	.247	.520***	.166	.004	.067	.122	.140	.045
7.				—	.453**	.013	.071	.149	.277	.454**	.090
8.					—	.115	.041	.064	.024	.014	.019
9.						—	.605***	.546***	.213	.008	.531***
10							—	.621***	.154	.145	.323*
11								—	.311*	.344*	.444**
12									—	.455**	.418**
13										—	.055
14											—

Table 4 Correlation of Nutrition teacher and head of school lunch

Q	4.	5.	6.	7.	8.	9.	10	11	12	13	14
4.	—	.716***	.504**	.287	.415**	.265	.255	.048	.189	.023	.277
5.		—	.451**	.436**	.394**	.456**	.498***	.215	.380*	.248	.514***
6.			—	.529***	.570***	.256	.328*	.019	.355**	.083	.336*
7.				—	.599***	.482**	.459**	.102	.430**	.009	.592***
8.					—	.369*	.316*	.175	.425*	.139	.568***
9.						—	.857***	.456**	.560***	.306*	.688***
10							—	.497**	.689***	.341*	668***
11								—	.450**	.451**	.383*
12									—	.365**	.721***
13										—	.502**
14											—

course of study, the school isn't able to handle the guidance of food education: 13 schools

- Problems related to family collaboration： 2 schools

(3) Interview investigation

The Aichi area has a number of center systems.

Therefore, the number of nutrition teachers is limited by the number of children. In the case of Aichi Prefecture, because the school nutrition staff isn't employed, the arrangement criteria of 1500 or less and 6000 or less of 2 people directly affect the number of nutrition teachers employed.

6. Discussion and Summary

What are the advantages of the placement nutrition teachers being placed, and what is different from the place displaced school? If you look at the results of the "Emphasis on food-related guidance and school lunch guidance" in the school management plan, it is clear, and it can be seen that the attitude to tackle is different. If the attitude of the leader is different, the teacher's efforts become ambitious because the target becomes clear naturally, and the children who receive the guidance become lively, too. Schools have educational goals. Schools have own educational goals. Based on this goal, goals in each field can be set, but the biggest factor of the decisive factor is to grasp the actual situation. If this point is ambiguous, what we are aiming for is blurred. The education in the school is systematized, and guidance is made according to this. This is evident from the differences in the survey results of "understanding the actual situation of students, parents, and communities". In addition, it is certain that it has had a significant impact on many teachers from "related subjects, etc. in each grade". Therefore, it goes to the guidance to the school where the nutrition teacher of the school which is arranged with emphasis on the investigation result is patrolling, and it isn't thought that the school lunch chief of each school gathers mainly in the nutrition teacher of the district and holds the workshop on the food education. However, it is thought that the number of the arrangement of the current nutrition teacher is small so that this can't be done. This means that "I am busy with cooking and office work in the kitchen, and I can't go to school during school lunch time, and I have been absent from staff meetings and even committee meetings. I feel miserable for not being able to perform as an original nutrition teacher."

Therefore, consider the number of arrangement of the nutrition teacher. In the Aichi area, there are all center systems. The number of nutrition teachers is limited by the number of meals of the number of children.

In the case of Aichi Prefecture, because it doesn't employ school nutrition staff, the placement criteria of one person of 1,500 or less and two people of 6,000 or less directly affect the number of nutritional teachers employed. At 45 schools in the Aichi area, there are 10 nutrition teachers, and one nutrition teacher will be in charge of 4.5 schools. In Aichi Prefecture as a whole, the situation in the Aichi area is very severe because one person is in charge of 3.7 schools in fiscal 2017.

Looking at Table 1 and 2 to further investigate this, there are three items with low average value in both the principals and nutrition teachers and school lunch chiefs. First of all, the lowest is "individual guidance for food education guidance" The reason why the nutrition teacher system started originally should have been because the staff who came to the school occasionally couldn't step into the individual guidance though the whole guidance was able to be done by the school nutrition staff. In particular, looking at Table 3 and 4 in particular, while "construction of team" and "improvement of the environment of faculty and staff" are highly correlated with "individual guidance for food education guidance and education" in the principal group, nutrition teachers and school lunch chiefs are "cooperation and coordination of educational guidance and guidance of subjects, etc." This is difficult unless the principal solves problems such as the placement of nutrition teachers why "individual guidance" can't be done well. On the other hand, nutrition teachers and school lunch chiefs place importance on the need to clarify the work of food education guidance because they aren't able to cooperate and coordinate educational guidance and guidance on subjects, etc., which is why "individual guidance" can't be done well. For this reason, until "individual guidance", if you don't get around, you may have given up half. However, the fact that this isn't done enough will be the same as what was done only by the conventional school nutrition staff in other words. As the elementary school principal said in the opinion corner, the low recognition of nutrition teachers is also mentioned from the fact that the question "Please tell me what kind of benefits there are when nutrition teachers are placed in schools when organizing a school" is mentioned. Then, it's necessary to understand the role which clarifies the existence of the nutrition teacher in common in all. It can be said that this is an essential teacher for all schools as it's clear from the difference of the numerical value seen from the four viewpoints of "Emphasis of the guidance and the school lunch guidance about the food" in the school management plan described above. The next lowest is the "improvement of the environment for faculty and staff, which is necessary for the school of the tee." Looking at Table 3, 4, there is a big difference in the items of the correlation between the principals and nutrition teachers and school lunch chiefs. The principals look at the relationship between "individual guidance on food education", "school management", "improvement

of the environment of faculty and staff" and "license qualification" among the 10 items, while the nutrition teachers and school lunch chiefs are "individual guidance on food education" and "individual guidance on food education" and "cooperation and coordination of guidance" are involved. Because of such a big difference, it is thought that the school isn't working on food education by working together with the principal as a team. In response to the idea of the principals in the position of managing teachers, the Central Council for Education said that in order to review the work to reduce overtime work of teachers," It is possible to reduce the burden by cooperating with specialized staff and others." As for the business, it isn't a big burden for the teacher, and the correspondence before that's a problem though that it's "the correspondence at the time of school lunch".

For example, it is a response to a child who has a lot of allergic reactions, including children who use Epi-Pen, and it is an interview with the guardian. It's a strange story to have the nutrition teacher and the clerical staff who are originally colleagues and busy to reduce the teacher's work.

As an emergency response at the time of school lunch, foreign matter contamination, there is food poisoning and allergies. Especially for food allergies, it is necessary to carefully check the school life management guidance table and to respond in advance, such as discussions with parents. This becomes correspondence at the time of the school lunch. However, it's impossible to respond sufficiently from the current nutrition teacher arrangement. If such a business is carried out, there is no choice but to put a school lunch manager in each municipality the business of one school one person system or school lunch center. In order to prevent a tragic accident at school lunch, it is a business to the nutrition teacher ". Individual guidance for children or students who require special consideration for food shall be carried out (Article 10, Paragraph 1 of the School Lunch Act)[7] It's necessary to ensure that. It is thought that this is despised from the low "improvement of the environment of the faculty and staff in the food education guidance".

Finally, the other purpose of this study is "Efforts for Food Education Related to the Improvement of Life Expectancy." The average life expectancy of Japanese people has secured a high number in the world[8]. Japanese men and women are 84.2 years old, the world's longest-lived country (WHO, 2018). However, do the elderly people in Japan live long and live healthily? There is a healthy life expectancy, and we investigate it every five years[9]. Since not all of the surveyed after a medical examination, the authenticity isn't clear, but it's a guide, so compare it with the average life expectancy. In

terms of numbers, men are 9 years short and women are about 12 years short. If this standard is used, men will be able to live healthy until the age of 71 for women until the age of 74. In order to improve this healthy life expectancy, the key is to ensure that the food education guidance of growing children is carried out. I'm confident that by the time the current students are over 70 years old, the results will be shown. However, this question item, when looking at The Table, 3, 4, the correlation coefficient with the item related to the work of the nutrition teacher and the school lunch chief group is higher than the principal group. It is necessary for the principal to listen to the voice of the nutrition teacher and the head of the school lunch chief who is directly related to food education, and to make an active effort so that this etc. can be put into practice. As the elementary school principal said in the opinion corner, "The problem of life expectancy and poverty is too big for school education and I don't know how to touch it" is a reasonable opinion. This problem isn't something that schools can avoid, but it's thought that it's necessary to take the initiative. As a solution, MEXT conducts "super food education school" [10] and We would like to consider measures to enable the development of small-scale activities in each district of the Aichi Prefectural School Lunch Association's "Promotion of Public Awareness and Food Education Support Project" This increases interest in school food education, which leads to the increase in the number of nutrition teachers.

The first school lunch was held at a private Cyuai elementary school in Tsuruoka Town (now Tsuruoka City) in Yamagata Prefecture in 1889[11]. For children who are poor and don't have lunch box, priest of the temple who runs an elementary school provides the ingredients collected in the bowl. In the 130 years since then, various systems have been established, and the current rate of school lunch penetration is 98.5% for elementary schools (99.1% when supplementary and milk meals are included) and 86.6% for junior high schools (89.9% when supplementary and milk meals are included) [12]. In addition, some junior high schools are considering full school lunch. In addition, as a division of the kitchen, there are its own school system, center system, parent-child method, and supplier lunch box system (some local governments don't position it as school lunch), and various initiatives are carried out. With regard to the guidance of school lunch, a new nutrition teacher system was established in 2005, and it is clearly stated that nutrition teachers will provide food education guidance (Article 10, paragraph 1 of the School Lunch Act). At the start of the system, MEXT explained that one person will be assigned to each school in the future, but even in 2019,

which is the 13th year, there is no sign of it at all. (The number of people in Japan in 2018 was increased by 232, but it was finally 6324.) Some local governments have adopted their own nutrition teachers in order to make good use of this nutrition teacher system. Education must be equal. All citizens have the right to receive a single education according to their ability, pursuant to the provisions of the law (Article 26, paragraph 1 of the Constitution). In the same area, it's urgent to ensure that future students can receive a single dietary education.

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[6] MEXT (March 2019) Guide to Food Guidance Chapter 3, "Overall Plan for Food Guidance"

[7] Ministry of Health, Labor and Welfare (July 30, 2019) Simple Life Table

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Relationship between Emotional Intelligence and Career Indecision among TVET Students in One of the Private Institution

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Abstract Career decision making is one of the most important components of individuals career development and the way individuals collect and process career relevant information's which affects the quality of their choices. Past studies have revealed that it is difficult for university students to choose an appropriate career. Several factors affect their decision-making processes, such as lack of preparation, wrong career choices and information that does not meet their requirements or is not helpful. Past research also indicated that emotional intelligence is vital in career planning decisions, and therefore it can help people make the right career choice. Individuals with emotional intelligence, for example, will be able to make career choices based on their interests and values. Students who are uncertain about their professions typically show a low level of emotional intelligence, possibly because they are unable to maintain functional social networks, thus preventing them from receiving the best information for making career decisions. Substantial studies have conducted to determine the factors that influence the decision of the student to choose a carrier; however, only some few studies highlighted vocational and technical undergraduates. Besides, most research on the personalities and cognitive abilities of the graduates, which seem to be the main factors, but the results are often inconsistent with the expectations of the researchers. Emotional intelligence mostly studied with organizational factors such as job performance, job satisfaction, turnover intention, organizational citizenship behaviour and workplace deviant. Nevertheless, empirical research investigating the correlation between emotional intelligence on the carrier decision-making process, particularly on students with TVET background is limited. TVET graduates enter the labour market with more proficient skills and knowledge in a specific field compared to conventional graduates. Therefore, selection of the appropriate carrier based on the competency is challenging. The purpose of this study is, therefore, to take a different view by focusing on the emotional intelligence factors predicting career choice. Fresh graduates with high emotional intelligence usually manage their emotions efficiently, make decisions and act wisely. In this quantitative study, the questionnaire distributed to 185 participants from private TVET organizations located in Klang Valley. The findings of this study were expected to contribute a new perspective to the literature by integrating emotional intelligence and student career choices. The possible outcome enhances the knowledge of the study, particularly in the field of TVET.

Keywords Emotional Intelligence, TVET Undergraduates, Decision Making, Entrepreneur Career, Social Cognitive Career Theory

1.Introduction

People typically make their first career related decisions during adolescence. Such decisions may have lifelong consequences for individual vocational future, psychological well-being, health and social acceptance (Wu & Li, 2011). Although some of the adolescents who are required to make these early career decisions do it so relatively easily, while others face difficulties before or during the actual process of decision making. These difficulties may lead them to attempt transferring the responsibility for making the decision to someone else or to delay or even avoid making decision. This may

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ultimately lead to a less than optimal decision. In addition, the way students handle these decisions may influence the way they will deal with the future carry addition

Career decision making is one of the most important component of individuals career development and the way individuals collect and process career relevant information affects the quality of their choices. Entrepreneurship is the least favored career option among Malaysian graduates as graduates usually expect to secure positions in the public and private sectors (Amran et al., 2014). According to the Job Status Update by MoHE (2010-2015), more than 90% of HEI graduates worked as employees, either in government sectors, multinational companies, local companies, government-linked companies or non-governmental organizations.

The data gives the indication that many HEI graduates prefer to be job seekers rather than job creators. The low popularity of the entrepreneurial career could be attributed to low awareness concerning the potential for entrepreneurship among the graduates (Norasmah & Salmah, 2011).

The percentage of graduates who are involved in entrepreneurship is still low despite various initiatives and policies drawn by the government to enhance entrepreneurship especially among the students of higher learning institutions. MoHE aims to produce 5% of graduates who can be self-employed or involved in entrepreneurial careers after the completion of their studies by 2020 (MoHE, 2016a). However, only around 2% of graduates are involved in entrepreneurship after the completion of their studies (MoHE, 2016b). Many Malaysian graduates regard the entrepreneurial career as their second or third career option (Norasmah & Salmah, 2011).

In Malaysia, the study by Norfadhilah and Halimah (2010) which comprised of public university students, found that besides personal gain factors, contribution toward society is also one of the most influential reasons which influence students to choose entrepreneurial career. In the study which comprised of 420 university students from Universiti Islam Antarabangsa Malaysia, Universiti Teknologi Malaysia and Universiti Utara Malaysia, profit orientation (81%) was cited as the most dominant factor influencing students to choose entrepreneurial career, followed by the desire to achieve success (80%).

Similar to the study by Norfadhilah and Halimah (2010), the research by Nor Aishah et al. (2016) also involved Malaysian public university students. Specifically, the samples in the study by Nor Aishah et al. (2016) were 364 participants of Graduates Entrepreneur Scheme (GES) from 2003 to 2006. From the 13 entrepreneurial career intention items, "Becoming more successful", "Progress in selected career" and "becoming a successful entrepreneur" were the three items with the highest mean scores. Based on these findings, it can be said that Malaysian students believe that entrepreneurial career is a career option which can provide them opportunity to progress and become successful.

This research aims to determine the levels of emotional intelligence among the students and also describe the contribution of emotional intelligence dimension in influencing student's entrepreneurial career choice. By linking emotional intelligence and entrepreneurial career choice, this study also adds a new perspective to literature. Findings can provide stakeholders

Fresh ideas for more appropriate initiatives to achieve governmental aspirations to produce more graduate entrepreneurs.

1.1 Research Questions

The research questions of this study are as below:
1. What is the level emotional intelligence among the TVET students?
2. Is there any relationship between emotional intelligence and entrepreneur career choice among TVET students?
3. What is the most dominant dimension of emotional intelligence which influences student's entrepreneur career choice?

2. Literature Review

2.1 Social Cognitive Career Theory (SCCT)

The Social Cognitive Career Theory (SCCT) by Lent et al. (1994) is grounded in Bandura's (1986) social cognitive theory. SSCT explores how career and academic interests mature, how career choices are developed, and how those choices are turned into action. SCCT postulates that one's career behaviour is affected by the interaction between personal and external influence factors. Personal factors include cognitive and affective attributes whereas external factor include the interpersonal interaction with the others.

SCCT explains that there are three main variables which affect the choice of career. The three variables are self-efficacy, outcome expectations and goals. Figure 1 below illustrates the interrelatedness of the three primary variables of the SCCT model.

Self-efficacy is defined as people's judgements of their capabilities to organise and execute courses of
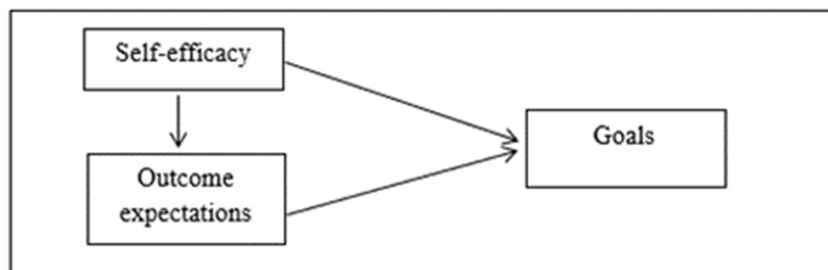

Figure 1: Social Cognitive Career Theory (SCCT) Model

action required to attain designated types of performances (Bandura, 1986b). Individuals develop their sense of self-efficacy from personal performance, learning by example and social interactions (Lent et al., 1994). Self-efficacy not only contributes to interests and goals directly, but also through its indirect effect on outcome expectations. The effect may be explained by the fact that people tend to expect more desirable outcomes in activities in which they see themselves to be efficacious (Bandura, 1986b).

Outcome expectations refer to the beliefs form as a result of an individual's expectations about the consequences of performing a specific behaviour (Segal et al., 2007). According to Lent et al. (1994), outcomes expectations include several types of beliefs about response outcomes, which include beliefs about extrinsic outcomes (such as receiving tangible rewards for successful performance), self-directed outcomes (such as pride in oneself for mastering a challenging task) and outcomes derived from the process of performing a given activity (such as absorption in the task itself). According to this theory, when people anticipate desirable outcomes from a career, they will have stronger interests and subsequently develop goals to enter the particular career.

A goal is defined as the determination to engage in an activity (Bandura, 1986). According to Lent et al. (1994), while environmental factors and personal experiences help to shape one's behaviour, the setting of specific goals help the individual to organise and direct their behaviour in a sustained manner and increase the likelihood that desired goals will be achieved. Goals are an important element of many career choice and decision-making theories although many terms have been utilised including career plans, career decisions and career aspirations (Segal et al., 2007).

To conclude, the SCCT model is used in this study as it was found to have strong predictive power for entrepreneurial career goals. Besides that, the concept of "goals" in the SCCT also best explains the decision to become entrepreneur as a career decision.

2.2 Entrepreneurial Career Choice

Although entrepreneurial career offers unlimited benefits and advantages, but the processes of entering entrepreneurial careers are very complex and unique. It involves a decision-making process to start and continue the efforts independently and individually (Wu & Li, 2011). Thus, establishing an aspiration or goal to be an entrepreneur is important as it reflects the desire to become an entrepreneur (Callanan & Zimmerman, 2016). By forming entrepreneurial career aspiration or goal, it helps to direct one's efforts or means in a more focused manner (Krueger, 1993; Callanan & Zimmerman, 2016). Schlaegel and Koenig (2014) also posited that the presence of entrepreneurial career aspiration has a strong impact on the act of becoming an entrepreneur.

To enhance the entrepreneurship mindset among students of higher education institutions, the Malaysian government has drawn several policies. In 2010, the Ministry of Higher Education launched the Higher Education Institutions Entrepreneurship Development Policy (Dasar Pembangunan Keusahawanan Institusi Pengajian Tinggi). The objectives of the policy are: to produce human capitals who have an entrepreneurial mindset, attributes and value; to increase the number of graduates who choose entrepreneurship as their career choice; and to produce academicians, researchers and administrators of higher education institutions who are competitive and have an entrepreneurial mindset (MoHE, 2010). Besides that, the Ministry of Higher Education has also drawn the Higher Education Institutions Entrepreneurship Strategic Plan 2013-2015 (Pelan Strategik Keusahawanan Institusi Pengajian Tinggi 2013-2025) to ensure the objectives stated in the HEI Entrepreneurship Development Policy are achieved (MoHE, 2016a). Under the strategic plan, the Ministry of Higher Education has outlined 15 strategies for public and private HEIs to achieve the entrepreneurship agenda of HEIs (MoHE, 2010).

However, despite the efforts taken by the government, not many Malaysians aspire to choose an entrepreneurial career. According to the 2016/17 Global Entrepreneurship Monitor (GEM) report, Malaysia recorded the lowest Total Early-stage Entrepreneurial Activity (TEA) rate in Asia and Oceania region. In 2016, the percentage of individuals who are in the process or have started new venture was 4.7%, which ranked Malaysia at 62 out of 64 countries in GEM. Besides that, the report also shows that entrepreneurship is not seen as a primary career choice in Malaysia as compared to other countries in this region. Only 44.1% Malaysians regarded entrepreneurship as a good career choice. A good career choice indicator is based on the percentage of the adult population between the ages of 18 and 64 years who believe that entrepreneurship is a good career choice.

In addition, the percentage of graduates who are involved in entrepreneurship is still low despite various initiatives and policies drawn by the government to enhance entrepreneurship especially among the students of higher learning institutions. MoHE aims to produce 5% of graduates who can be self-employed or involved in entrepreneurial careers after the completion of their studies by 2020 (MoHE, 2016a). However, only around 2% of graduates are involved in entrepreneurship after the

completion of their studies (MoHE, 2016b). Many Malaysian graduates regard the entrepreneurial career as their second or third career option (Norasmah & Salmah, 2011).

Entrepreneurship is the least favoured career option among Malaysian graduates as graduates usually expect to secure positions in the public and private sectors (Amran et al., 2014). According to the Job Status Update by MoHE (2010-2015), more than 90% of HEI graduates worked as employees, either in government sectors, multinational companies, local companies, government-linked companies or non-governmental organisations. The data gives the indication that many HEI graduates prefer to be job seekers rather than job creators. The low popularity of the entrepreneurial career could be attributed to low awareness concerning the potential for entrepreneurship among the graduates (Norasmah & Salmah, 2011). In view of the large percentage of graduates whom are left in the world of work despite their exposure to entrepreneurial education, an investigation into factors influencing students' aspirations toward entrepreneurship is needed.

2.3 Emotional Intelligence

Emotions are defined as the psychological or biological predisposition of individuals as feelings, thoughts and uniqueness (Goleman, 2005). The capacity of a person to recognize, understand and express emotions is emotional intelligence (Hughes et al., 2005). When planning, individuals with emotional intelligence are able to assimilate and balance their feelings (Mayer and Salovey, 1997).

The dimensions of emotional intelligence include namely self-awareness, emotion management, empathy and social skills. Such dimensions are critical for monitoring the emotions of the workers themselves and others they work with (Goleman, 1995, 2004). For example, self-awareness dimension enable individual to understand the emotions, strength, weakness and the value of other individual. A person with this quality will able to control their emotion and behave appropriately when working with others.

Emotional management refers to an individual's ability to deal with his or her negative emotions to take adequate action (Goleman, 2005). A person who able to manage emotion during time of challenge could handles feelings of anger, fear or anxiety. People who can efficiently handle their emotions usually can focus their emotions and maintain their desired behaviour. Empathy is defined as a person's ability to feel or understand the feelings of others. Empathic people can experience others' emotions as themselves (Corey, 2009). Final

dimension social skills refer to how individuals manage their social relations. Those with good social skills benefit by being able to lead others to a desired goal (Goleman, 2004). Thus, entrepreneurs with good social skills can effectively lead their employees to the achievement of organisational objectives.

Brundin et al. (2008) found that individuals with high emotional intelligence are usually highly motivated and understanding of others. Consequently, this ability will impact individuals' interests in and preferences for entrepreneurship. Individuals with high emotional intelligence will seize opportunities and think innovatively.

3. Methodology

In this quantitative study, the questionnaire distributed to 185 participants from private TVET organizations located in Klang Valley. Respondents were selected by using a simple random sampling technique since it has widely been used in various correlation research design. The selected students were the final year students from the various program of vocational. Carrier Decision Difficulties Questionnaire (CDDQ) was adapted from Gati, Krauz & Osipow (1996) to measure the dependent variable; meanwhile Emotional Intelligence questionnaire was adapted from Schutte et al. (1998). The subject expert validated the instrument used in the study. A pilot study was performed to determine the reliability of the variables which found to be more than Cronbach alpha 0.70. SPSS Version 25 has been used to perform various tests, such as reliability, Pearson, Multiple Regressions and Descriptive statistics.

4. Results

The descriptive and inferential analyses which provide answers to research objectives 1- 5 are presented below. In interpreting the research findings, the researcher refers to the interpretation scale by other researchers. For research objective 1, mean score is used as a reference and the mean score is interpreted based on the mean score interpretation scale by Norasmah and Salmah (2011). For research objective 2, Pearson correlation analysis (r) is used to determine the correlations coefficients and significant value. Correlation interpretation scale by Cohen (1988) is used as a reference. For research objective 3, multiple regression analysis is applied to determine the most dominant factor which influences the student's entrepreneur career choice.

4.1 Level of Emotional Intelligence

Table 1 consists of descriptive analysis which was

Table 1: Level of Emotional Intelligence

Items	Mean	Level
Self-awareness	3.23	Moderate High
Emotion management	3.59	Moderate High
Empathy	3.18	Moderate High
Social skills	3.31	Moderate High

conducted by extracting the mean value and interpreting those average values. The result of this analysis will answer research question 1. From the Table 1, it is clearly showing the entire mean score range from 3.00 to 4.00 which indicates that respondent's emotional intelligence ranged in moderate to high level. Thus, it means that those TVET students perceived moderate high emotional intelligence based on dimensions.

4.2 Correlation Analysis

The researcher conducted this analysis to answer research question 2 t which designed to investigate either there are significant relationships between the independent variables and the dependent variable. Prior to test, the researcher conducted Normality test to meet the assumption of Pearson Product Moment of Correlation. Since the skewness and kurtosis met the requirement which suggested by Ary, Jacobs and Walker (2014), therefore the researcher run the correlation analysis and the results were displayed in Table 2 below. The correlation coefficients found in all the variables were between the ranges of 0.2 to 0.8. In addition, all the p-value was lesser than alpha (0.05) which indicates there were existent of significant relationship between the variables.

The correlation analysis indicates that there is a linear relationship between emotional intelligence dimensions and student's decision to become entrepreneur. Among all the dimension it was found that emotional management (r=.767, p<.05) has the strongest correlation towards the student's intention to be entrepreneur.

4.3 Multiple Linear Regression

From this analysis the researcher will be able to determine how much the combination of the four predictor variables contribute to the students' entrepreneurial career choice. The ability of all the predictor variables

together to predict the outcome variable was indicated by multiple correlation coefficient (R). Before conducting the multiple regression analysis, the researcher checked whether the assumptions of multiple regression analysis were met in order to get an accurate analysis. The assumptions of multiple regression analysis included sufficient sample size, linearity, normality, homoscedasticity, and multicollinearity

Table VII shows the contribution of each predictor variable. Emotion management (0.481) has the greatest contribution to the formation of entrepreneurial career choice behaviours. Thus, 21.1 per cent of the variance in the dependent variable (entrepreneurial career choice behaviour) is associated with the independent variables (self-awareness, emotion management, empathy and social skills).

From the coefficient table, the researcher creates regression equation of this survey:

$(Y) = 0.756 + 0.047(X1) + 0.481(X2) + 0.065(X3) + 0.248(X4) + e.$

5. Discussion

The findings explained individual with the ability to regulate one 's emotions and with others was found significantly correlate with the propensity to start a business. Persons who can handle this function more often engage in entrepreneurship, because they can identify the opportunities around them (Baron 2008). Furthermore, emotionally intelligent are often associated with creative and innovative. People with high levels emotional intelligence can generate creative ideas that can ultimately shape their business qualities and lead eventually to enterprise (Ngah and Salleh, 2015).

Entrepreneurial behaviour is also affected by emotional intelligence, as high-emotional students have proven better in developing their company (Zampetaskis

Table 2: Correlation Analysis

Variables	n	Pearson (r)	p-value
Self-awareness	108	0.293	0.000
Emotion management	108	0.767	0.000
Empathy	108	0.211	0.000
Social skills	108	0.654	0.000

Table 3: Multiple Regression Analysis

Predictors	B	SEB	β	t	p
(Constant)	.756	.333		1.654	.003
Self-awareness (X₁)	.047	.012	.041	0.583	.543
Emotion management (X₂)	.481	.013	.435	8.740	.000
Empathy (X₃)	.065	.010	.057	0.983	.610
Social skills (X₄)	.248	.011	.211	4.683	.001

Note: R^2 = .211; F= 10.42, Sig=0.001

et al., 2009). Emotional intelligence can also help people effectively resolve issues, since they can manage their emotions effectively (Bahadori, 2012). In addition, entrepreneurship demands high mental and emotional strength.

The findings of the research were aligned with the previous study conducted by Brown (et al., 2003; Di Fabio and Blustein, 2010; Emmerling and Cherniss, 2003; Kidd, 1998) explains that emotional intelligent place an important role in enhancing an individual's career development. Thus, the past study strongly agrees that making decision to embark into a career involving emotion therefore understanding and regulating the right emotion will enable an individual to make the right choice.

6. Conclusion

As conclusion this study had revealed that TVET students with emotional intelligence could make better decision especially in choosing entrepreneur as their career. Knowing this fact, TVET institution should focus more on including emotional intelligent as part of their syllabus. Incorporating emotional intelligence into their venture would enable the students to heal quickly from the downfall of the business. The future study should look into other dimensions of emotional intelligence and test whether those dimensions would influence the student's entrepreneur career decision. This study contributes towards enriching the body of knowledge and practice in the entrepreneurship field. Firstly, this study contributes to the theoretical knowledge in the context of entrepreneurial intentionality. By incorporating both the Social Cognitive Career Theory and the Goleman Emotional Intelligence Theory, the findings of this research enable entrepreneurial researchers and practitioners to have a better understanding in predicting students' entrepreneurial behaviour. Specifically, this research enriches the knowledge about the influence of both personal attributes and externally influencing factors on one's entrepreneurial career choice.

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A Study on the Relationship among the Career Self-efficacy, and the Career Anchor for Students in Senior Vocational School

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Abstract The purpose of the study was to investigate the situation, correlation, prediction, and to analyze the differences among the work values, the career self-efficacy, and the career anchor for students in senior vocational schools. The questionnaires were distributed with stratified random cluster sampling. The data included 458 effective subjects. collected and scored by the Likert 5-point scale, and analyzed by SPSS. The study results were summarized as follows: The work values and professional self-efficacy of object are positive, but the career anchor is not yet determined. Differences in gender, grades and subjects have significant differences in the value of work; students' work experience and departments have a great impact on career self-efficacy; technical and vocational education learning content is also significantly different in terms of career anchoring. In addition, work values and career self-efficacy are significantly related; work values and career self-efficacy can effectively predict career anchors up to 17.8%. For vocational education students, the improvement of work values and self-efficacy is very important and affects the exploration of career anchors. Therefore, different career counseling strategies should be adopted to help students anchor their careers earlier.

Keywords students of seiner vocational school, work values, career self-efficacy, career anchor

1. Introduction

1.1 Research background and motivation

Under the impact of the rapid changes in the overall economic development of the labor market, the change of the overall structure has always been a topic of concern for vocational education. Especially in recent years, the demand for employment in emerging markets is urgent. There can be a ready-to-use vocational education system. The backing of future industrial development will also be the important investment that governments of all countries need to invest in industrial development.

For the technical and vocational schools that use education to train talents for future occupations, they have supported Taiwan's important tasks of economic development since the 1960s and 70s. The technical and vocational education goals at that time were quite clear and simple. Every technical student can clarify the direction of future employment, but under the development of a diploma-oriented education structure, a degree has become a new goal for students, instead of focusing on technology and professionalism.

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MOE legislation passed Technical and Vocational Education Act in 2015. And mentioned career information education in article, such as schools shall offer courses that provide vocational information and workplace visits, and career guidance courses. Technical and vocational education is cultivating various specialized vocational and technical talents. For the industry, it is the supply of good technology. For students in technical and vocational schools, it is the best career preparation and can also promote a lifelong career. Development (Hu Menglei, 2004; Yang Chaoxiang, 2007) Faced with different stages of career development, there will be different development goals (Liu Kunhui, 1997; Zhu Xiangji, 2006)

Unemployment is one of the problems faced by many countries. A gap between the skills required for employers and possessed by graduates is one of the factors affecting unemployment. In such situations, it is important to investigate whether life and career skills are embedded by higher education institutions, especially regarding technical and vocational education since they provide a semi-skilled and skilled workforce to compete in the global labor market. (Nurhanim Saadah et al., 2020)

Super (1957) career development theory is based on a person's life course and is divided into five stages including 1. Growth: 0-14, 2. Exploration: 15-24 years old; and 3. Establishment: 25-44 years old. 4. Maintenance stage (Maintenance): 45-64 years old, 5. Decline stage (after 65 years old) (Wu Zhiyi, 2000)

Individuals usually start to realize the important role of career in life during the exploratory period, so they begin to conduct self-examination, role exploration and career exploration in school, various work experiences and leisure activities. Research data from Xu Ya-lan (2008) pointed out that in the 2006 National Taiwan University survey of freshman students, 67.4% of those who are still exploring their career direction, while in foreign studies, only about 23%~32% of 18-year-old students are not sure of themselves Career development direction.

Unfortunately, the service industry that does not require too much professional training and certification has become the first choice for young people to work, and they have not focused on enhancing professional functions and strengthening their career development plans for applying what they have learned. Higher vocational students' uncertainty in their career anchors, deviations in work values, and low career self-efficacy should be further concerned.

1.2 Purpose of this research

Based on the above research background and motivation, the purpose of this research is as follows:

1. To understand the current status of vocational students' work values, career self-efficacy and career anchor.

2. Analyze the differences in work values, career self-efficacy and career anchor among vocational students of different backgrounds.

3. Explore the relationship between work values, career self-efficacy and career anchor of vocational students.

Finally, based on the research results, specific career counseling suggestions are put forward as a reference for improving the career exploration education of vocational students.

1.3 Research Objectives

According to the above research purpose, the questions of this research are as follows:

1. What is the current status of vocational students' work values, career self-efficacy and career anchor?

2-1 Are there differences in work values among vocational students of different backgrounds?

2-2 Are there differences in career self-efficacy among vocational students of different backgrounds?

2-3 Are there differences in career anchor among vocational students of different backgrounds?

3-1 Is there a significant correlation between vocational students' work values and career self-efficacy?

3-2 Is there a significant correlation between the work values of higher vocational students and career anchor?

3-1 Is there a significant correlation between career self-efficacy and career anchor of vocational students?

4. Do the work values and career self-efficacy of higher vocational students have joint predictive power for their career anchor?

2. Literature Review

2.1 Work values

Super (1970) believes that the main factor that affects an individual's career choice is "work values." Understanding self-work values is an important basis for choosing a career and ensuring the possibility of job satisfaction. Values mean: an individual's inner choice is the basis for "important things in life" and "right behavior"; individual values are formed as the body and mind grow gradually, and are internalized as part of individual personality (Rokeach, 1973)

That values often have the role of standardizing, guiding and promoting the life goals and behaviors of individuals. From the perspective of career development, it is necessary to have clear values in order to make correct career choices. In addition, from the perspective of school education, students' behavior, attitudes and values are all possible to change, which inspires the establishment of correct values Important period (Huang Guangguo, 1993), so it is really necessary to discuss the issues related to the work values of college students at the school stage.

2.2 Career self-efficacy

Bandura (1982) published the theory of self-efficacy, which refers to an individual's assessment of his own self-efficacy when facing a challenging job to decide whether to go all out. The career self-efficacy theory emphasizes the personal beliefs that affect behavior and the cognitive process that moderates or adjusts behavior (translated by Li Maoxing, 1998). Through Jin Shuren (2006) self-efficacy causality diagram, we can clearly understand the importance of self-efficacy. Super (1957) Life-Span, Life-Space Theory is based on a person's life course, promotes the development of the individual's career through career counseling, constructs their own unique life style, and encourages individuals to be responsible for their career development.

Therefore, when facing individuals at different stages of career development, they should have different goals (Liu Kunhui, 1997: Zhu Xianggu, 2006). Strengthening the cultivation of students' career choice ability is
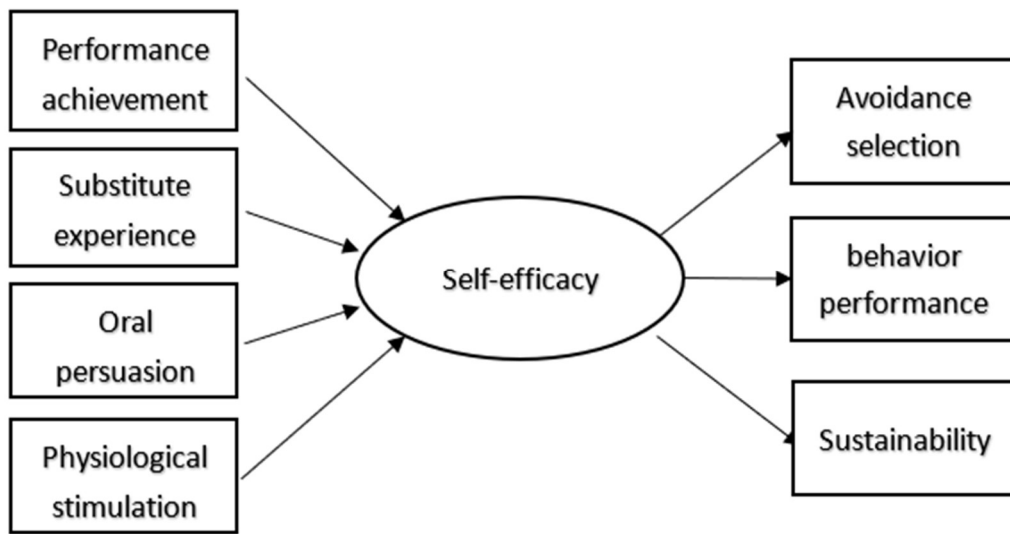
Figure 1. Self-efficacy causality diagram
Source: Jin shuren (2006)

the key task of career guidance in technical and vocational schools. (Xue Huiping, 2007)

2.3 Career anchor

Relevant career anchoring is considered to be the primary task of career planning, and the clarification of personal career characteristics is an important beginning of the overall continuation. With a clear career direction, it is possible to gather energy and limited resources to show different levels of key traits.

Wu Zhiyi (2000) The career decision and career development model of social cognitive career theory

(Figure2) specifically presents the relationship between career development and orientation.

Teenagers will face three major choices in life: one is to choose high school or a technical career, the other is to choose to study in the natural group or the social group, and then there will be a selection involving future careers. (Huang Huiru, 2012)

Wu Shuzhen's (2012) research found that the factors affecting career non-orientation are mainly in "dual conflict" and "self-knowledge." In addition, the two values of "organizational safety and economic orientation" and "self-actualization" can achieve 11% predictive
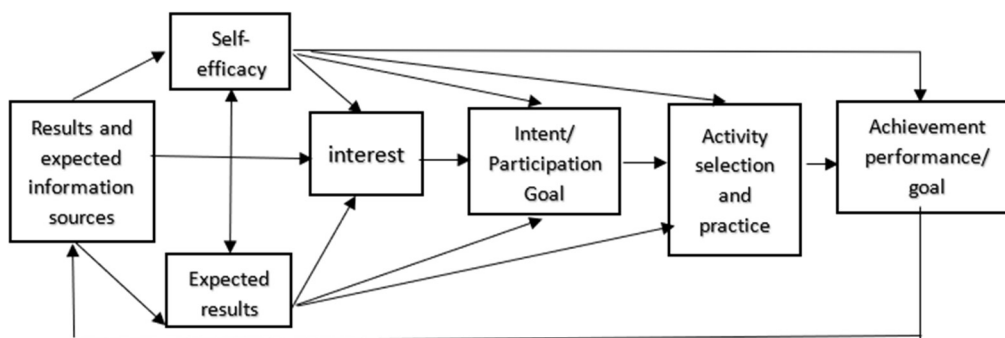
Figure 2. The career decision and career development model

Source: Wu Zhiyi (2000)

power for career anchors.

3. Research Method

This research mainly uses questionnaires to understand the work values, career self-efficacy and career anchoring of vocational students. The research questionnaire mainly refers and revised from Xu Yalan (2008) study on the work values, career self-efficacy and career anchoring of foreign students in technical and vocational schools, and use SPSS 20.0 statistical package software for data analysis.

3.1 Research object

In this study, the questionnaire was distributed to a public higher vocational school in Yunlin County by means of cluster sampling. There are 5 subjects in this school: (1) Dept. of Data Processing (2) Dept. of International Trade (3) English Program, Dept. of Applied Foreign Languages (4) Dept. of Advertisement (5) Dept. of Early Childhood Care and Education. One class will be selected from each subject for each grade for testing. There are 488 questionnaires were distributed and 458 valid questionnaires were returned. The recovery rate was 93.9%.

3.2 Research Framework

Each research approach in this research framework is described as follows:

A: Explore the differences in work values of higher vocational students with different personal background variables.

B: Explore the differences in career self-efficacy of higher vocational students with different personal background variables.

C: Explore the differences in career anchors of higher vocational students with different personal background variables.

D: Analyze the correlation between vocational students' work values and career self-efficacy.

E: Analyze the relationship between work values and career anchors of vocational students.

F: Analyze the correlation between career self-efficacy and career anchoring of vocational students.

G: Explore the joint predictive power of vocational students' work values and career self-efficacy on their career anchors.

3.3 Research tool

This research questionnaire consists of 4 parts: Work Value Scale, Career Self-Efficacy Scale, Career Anchor Scale, and background variables, including gender, grade, work experience, and main subject.

3.3.1 Work values

This scale was revised with reference to Xu Yalan's (2008) "Work Values Scale" for college students. The scale is divided into purposeful work values and instrumental work values. After the revision, the pre-test is carried out in accordance with the description of higher vocational students. The purposeful work values scale has 16 questions, and the dimensions were renamed as Intrinsic reward, Extrinsic compensation, Peace and harmony, Public Interest, Dedication, Traditional ethics.
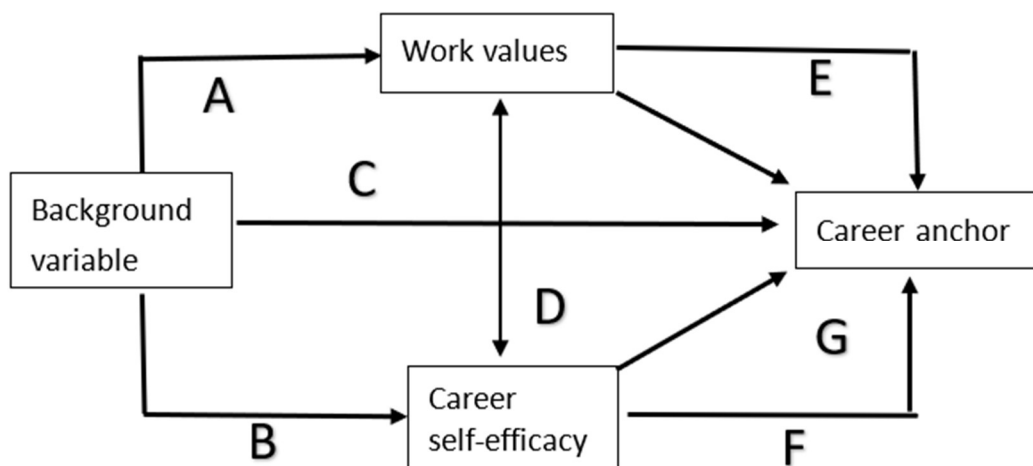

Figure 3. Research Framework
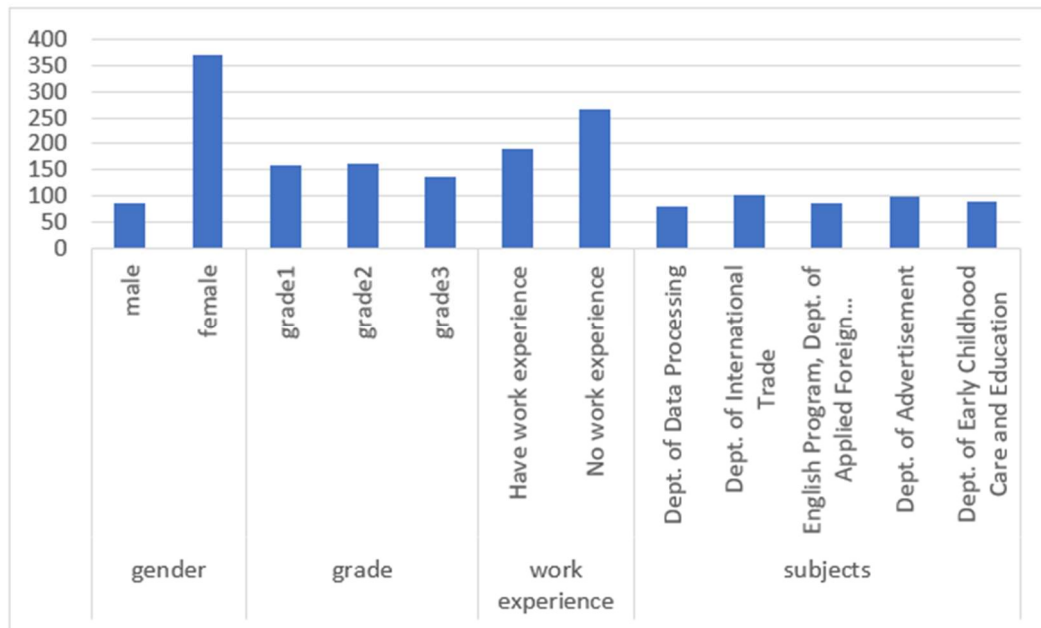
Figure 4. background description

The explanatory variation amounts to 70.0%. For the part of the Instrumental Work Value Scale, 21 questions will be retained after project analysis. 2 Dimensions renamed professional competence and traditional ethics, which can explain 56.6% of variation. The scale Cronbach's Alpha value is .956.

3.3.2 Career self-efficacy

This scale was revised with reference to the "Career Self-Efficacy Scale" of Xu Yalan (2008) for researching college students. The scale originally had 25 questions. After project analysis, the related and low-decision questions were deleted and 24 questions were retained. The five dimensions were renamed to Develop confidence, Clear goal, Modify Correction, Proposal drafting, Problem solving, and the amount of explainable variation reached 57.3%. Scale Cronbach's Alpha value. 924

3.3.3 Career anchor

This scale uses Xu Yalan (2008) to study the "Career Anchor Scale" for college students for the revised pre-test. After item analysis and deletion of unsuitability, the number of questions is 11. The explained variation is 57.2%. Scale Cronbach's Alpha value.925

4. Result Analysis and Discussion

There are a total of 458 valid questionnaire subjects. Descriptive background statistics include gender, grade, work experience, and department as shown in Figure 4.

4.1 Current status of work values, career self-efficacy and career anchor

4.1.1 Work values

The average value of "the purposeful work values form question" (4.05) is lower than the average of "the instrumental work values form question" (4.24), and the average of the total table (4.16), which shows the importance of higher vocational students in work values degree ranges is between "important" to "very important" level.

Each aspect is Intrinsic reward (SD=5.49, M=4.16), Extrinsic compensation (SD=1.77, M=3.46), Peace and harmony (SD=1.88, M=4.38), Public Interest (SD=2.34, M= 3.83), Dedication (SD=9.67, M=3.38), Traditional ethics (SD=2.57, M=3.44).

4.1.2 Career self-efficacy

The descriptive analysis of the Career Self-efficacy Scale found that the average is 3.73, which is between "normal confidence" and "some confidence". Each aspect is Develop confidence (SD=4.43, M=3.51), Clear goal (SD=3.05, M=4.15), Modify Correction (SD=2.86, M=3.66), Proposal drafting (SD=3.57, M= 3.80), Problem solving (SD=2.65, M=3.49).

4.1.3 Career anchor

The average score of each question on the Career Anchor Scale (M=3.44) shows the state of the career of vocational students.

From the each scale describes analysis results the work values, Peace and harmony (M=4.38) is the most valued, and the development confidence in career self-efficacy is also the highest, but the certainty of career anchor is low. This result is in line with the Super career development stage theory, pointed out that the young people belong to the exploratory period.

4.2 Difference analysis

4.2.1 Analysis of differences in work values

Gender is significantly different in the Intrinsic reward facet (t=-2.231, p<.05), female>male.

Extrinsic compensation (t=-.914,p>.05), Peace and harmony (t=-.908,p>.05), Public Interest (t=-.833,p>.05), Dedication (t= -.299,p>.05), Traditional ethics (t=.312,p>.05) had no significant difference.

There is a significant difference between whether there is work experience in the Dedication dimension (t=2.797, p<.05), (work experience >no work experience).

Intrinsic reward (t=1.436,p>.05), Extrinsic compensation (t=.709,p>.05), Peace and harmony (t=1.356,p>.05), Public Interest (t=1.805,p> .05), Traditional ethics (t=1.045, p>.05) no significant difference.

Compared with the difference of work values in grades, only Traditional ethics (F=3.631, p<.05) reached a significant difference (grade1>2). Intrinsic reward (F=1.503, p>.05), Extrinsic compensation (F=2.390, p>.05), Peace and harmony (F=.032, p>.05), Public Interest (F=2.878, p> .05), Dedication (F=.435, p>.05) had no significant.

Item subjects have significant differences in Intrinsic reward (F=4.047,p<.05), Public Interest (F=2.888,p<.05), Traditional ethics (F=3.263,p<.05), (1) Dept. of Data Processing＞(22) Dept. of Advertisement (23) Dept. of Early Childhood Care and Education.

The remaining Extrinsic compensation (F=2.297, p>.05), Peace and harmony (F=2.027, p>.05), Dedication (F=1.960, p>.05) had no significant differences.

4.2.2 Analysis of differences in career self-efficacy

There is no significant difference in career self-efficacy by gender. Develop confidence (t=-.509, p>.05), Clear goal (t=-1.811, p>.05), Modify Correction (t=1.083, p>.05), Proposal drafting(t=.213p> .05), Problem solving (t=1.483, p>.05).

Comparing work experience, there is a significant difference in overall career self-efficacy (t=3.294, p<.05) and also in Develop confidence (t=3.111, p<.05), Clear goal (t=-1.819, p<. 05), Proposal drafting (t=2.129, p<.05) (no work experience> work experience). Modify Correction (t=2.637, p<.05), Problem solving (t=3.896, p< .05) is. (work experience) > (no work experience).

Comparison of differences in grades found that overall career self-efficacy (F=3.822, p<.05) reached a significant difference (grade3>1). Develop confidence (F=11.700, p<.05) learned from schffe's post-comparison, (grade3>1,2). Other Clear goal (F=.419, p>.05), Modify Correction (F=1.530, p>.05), Proposal drafting (F=2.311, p>.05), Problem solving (F=2.166, p> .05) No significant difference.

Comparison of the differences in the subject's career self-efficacy found that Proposal drafting (F=3.206, p<.05) had significant differences, and afterwards, it was found that (22) Dept. of Advertisement> (1) Dept. of Data Processing. Develop confidence (F=2.790, p<.05) and Modify Correction (F=2.682, p<.05) were also significant, but they were not significant in the post-comparison group. The remaining Clear goal (F=2.351, p>.05) and Problem solving (F=0.793, p>.05) have no significant differences.

4.2.3 Analysis of differences in career anchors

There were no significant differences in gender (t=1.418, p>.05), work experience (t=-1.458, p>.05) and grade (F=0.989, p>.05).There is a significant difference in subject. The scores of the Dept. of International Trade students on the uncertainty of career anchor are higher than the Dept. of Early Childhood Care and Education students (reverse scoring), In other words, early childhood care students have better anchors in their careers.

4.3 Correlation analysis

There is a significant correlation in the analysis of work values and career self-efficacy. Dedication .606**

Table 1: The relationship between work values and career self-efficacy

career self-efficacy work values	Develop confidence	Clear goal	Modify Correction	Proposal drafting	Problem solving
Intrinsic reward	.447**	.533**	.352**	.434**	.388**
Extrinsic compensation	.327**	.296**	.292**	.225**	.230**
Peace and harmony	.251**	.414**	.266**	.278**	.211**
Public Interest	.377**	.390**	.283**	.356**	.374**
Dedication	.373**	.606**	.361**	.411**	.430**
Traditional ethics	.243**	.237**	.179**	.187**	.321**

Table 2: Relationship between career orientation and work values

work values career anchor	Intrinsic reward	Extrinsic compensation	Peace and harmony	Public Interest	Dedication	Traditional ethics
Career anchor	-.003	.107*	.130**	.088	.173**	.166**

Table 3: The relationship between career anchor and career self-efficacy

career self-efficacy	Develop confidence	Clear goal	Modify Correction	Proposal drafting	Problem solving
Career anchor	-.215**	-.046	-.101*	-.242**	-.066

Intrinsic reward.535** has a higher correlation with Clear goal.

The findings of the correlation analysis of career anchoring and work values, career anchoring and career self-efficacy is significant, but in the correlation coefficient is low.

In other words, the more important work values are, the less clear career anchors there will be. The higher the self-efficacy, the clearer the career direction will be.

4.4 Multiple regression analysis

According to the table, the standard regression equation is as follows:

Career anchor =-.080×Intrinsic reward +.084×Extrinsic compensation +.059×Peace and harmony +

.062×Public Interest +.216**×Dedication +.104*×Traditional ethics +-.257***× Develop confidence +.086×clear goal +.073×Modify Correction +-.336***×Proposal drafting +.040×Problem solving. The results of multiple regression analysis are shown in Figure 8, and explainable variation is 17.8%.

The results of the study found that part-time job and internship experience have a significant relationship with their work values, and girls pay more attention to work values than boys (Huang Yunzhen, Lin Shuhui, 2010)

Maturity at age will also affect career self-efficacy and career anchoring. In this study, it is consistent with the cognitive information processing theoretical point of view. As the grade increases, personal self and industry

Table 4: Multiple regression analysis on career anchoring

mode		Unstd. coefficient		Std. coefficient	t
		B estimate	Std. error	Beta distribution	
	(intercept)	29.316	3.676		7.97
	Intrinsic reward	-.138	.110	-.080	-1.26
	Extrinsic compensation	.452	.271	.084	1.67
	Peace and harmony	.297	.287	.059	1.03
	Public Interest	.250	.249	.062	1.00
1	Dedication	.212	.065	.216	3.25**
	Traditional ethics	.384	.189	.104	2.03*
	Develop confidence	-.551	.138	-.257	-4.00***
	clear goal	.268	.217	.086	1.235
	Modify Correction	.245	.201	.073	1.216
	Proposal drafting	-.896	.178	-.336	-5.02***
	Problem solving	.143	.206	.040	.696

R.447^a R^2 .199 adjusted R^2 .180 F 10.100
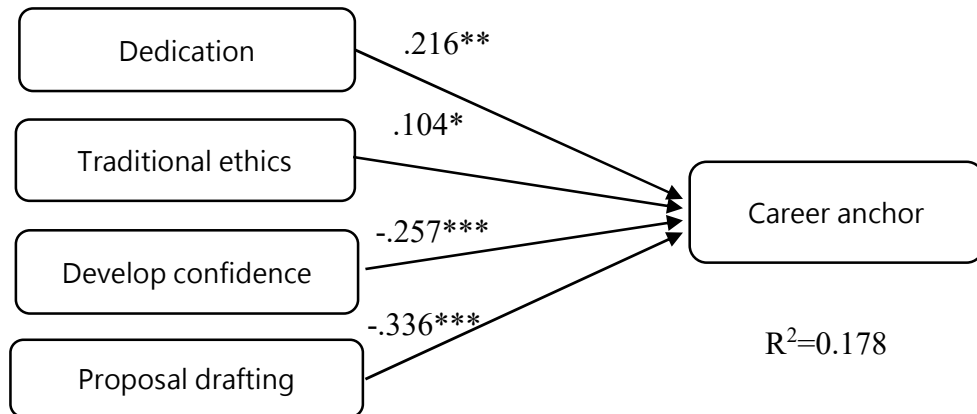*p<.05, **p<.01,*** p<.001

Figure 5. Multiple line production regression analysis

knowledge increase, and decision-making ability improves, the more able to determine career goals (Super, 1957 ; Zhao Yuxuan, 2006: Petreson, Sampson & Reardon, 1991 Adams. Ryan & Keating. 2000).

Nurhanim Saadah et al., (2020) believe that providing semi-skilled and fully-skilled labor in technical and

vocational education is important to enhance the competitiveness of the labor market. In this multiple analysis, the presentation of professionalism, traditional ethics, self-confidence in development, and proposal drafting can significantly predict career anchor. In line with previous research findings, career development is consistent with the belief that emotional stability, outgoing and talkative, innovative opening, trust and cooperation, and cautious and responsible, tend to have a positive relationship. (Wang Conggui, 1995).

5. Conclusion and Suggestion

From the overall research, it is found that the work values and professional self-efficacy of higher vocational students are positive, but the career anchor is not yet determined. Differences in gender, grades and subjects have significant differences in the value of work; students' work experience and different departments also have a great impact on career self-efficacy; technical and vocational education learning content is also significantly different in terms of career anchoring.

In addition, work values and career self-efficacy are significantly related; the "dedication" and "traditional ethics" in work values and the "development confidence" and "planning" in career self-efficacy can effectively predict career anchors up to 17.8 %.

For vocational students, the improvement of work values and self-efficacy is very important and affects the exploration of career anchors. Therefore, for students in different subjects in technical vocational schools, different career counseling strategies should be adopted to help students anchor their careers earlier. And it should be started at the entrance stage, which is a task that the school needs to work hard in the future.

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Korean Middle School Students' Education and Employment Path Patterns and Determinants after Graduation Based on the 1st-12th Korea Education Employment Panel Survey

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Abstract The purpose of this study is to find out the education and employment paths after graduating from Korean middle school in 2004, to identify pattern of the paths and the determinants for each pattern. As a result of dividing after middle school into high school, college, university and work stages, the distribution of education employment after middle school differs according to the type of high school. Vocational high school, the rate that leads to employment is high, and the rate of admission after employment is high, indicating that the original purpose was achieved. Next, by clustering of education and employment paths, vocational high school-college-regular employment (pattern 1), general high school-university & unknown-regular employment (pattern 2), general high-university-regular employment (pattern 3), general high school-college-regular employment (pattern 4), vocational high school-college-regular employment (Pattern 5). Each pattern was classified into gender, academic achievement, educational aspirations, monthly average household income and private education expenditure, parents' academic background, parents aspiration of children's education, and communication about career paths with parents. It is possible to provide outline information on education and employment paths after middle school, and to give implications to career guidance according to the characteristics of each pattern of student.

Keywords career path, cluster analysis, career path determinants, middle school student

I. Introduction

Middle school students are the time to search for a career path. Super (1953) and Ginzberg et al. (1951) refer to the middle school period as a tentative period, and that it is important to search for information about a career path to develop skills and to search for information to make a temporary career decision before the high school period, which determines a specific career path. In addition, since the middle school period is a stage in which decisions are made to narrow down the desired occupational group, a study is conducted on the means and purpose of pursuing careers, and it is necessary to search for career information (Tuckman, 1974; Gelatt, 1962) Emphasizes the need to provide information appropriate to the stage of career development to middle school students. In particular, the third grade of middle school is the time when it is decided to go to high school, and when determining the type of high school, it is necessary to provide information on what kind of education and employment paths experience after entering the high school. It is necessary to provide information that can help when choosing a career by presenting the path through which education and employment proceed after selecting a high school type.

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The individual education and employment paths of the middle school students can appear in various aspects, and it is necessary to categorize the various paths of individuals based on similarity and divide them into heterogeneous groups within middle school students to provide career education tailored to each group. It can be seen through several studies that differences in career decisions, career maturity, and high school selection of middle school students are found according to the characteristics of individuals, families (Kim, 2009; Ahn & Lee, 2009; Song, 2009; Oh et al., 2010; Lim, 2013; Jeon, Lim & Seong, 2015). However, these studies show only the middle school period in fragments. Since education and employment paths mean career paths, a longitudinal search for middle school students' career paths can be made, and heterogeneous subgroups are identified through categorization based on similarity, and factors that influence education and employment decisions after middle school are identified. If it can be discriminated, it will be possible to find educational plans for career guidance for middle school students.

An individual's education and employment path can affect his or her job status and income in the future labor market. In particular, education, which means the degree of education, acts as an important factor in determining job status and income level in the labor market (Nam, 2003). Therefore, efforts of individuals and families to obtain high-level education have been continuing until now, and the characteristics of individuals or families can act as factors that determine education or

employment. In particular, since parents' socio-economic status can influence their children's academic achievement and affect educational opportunities and achievements, education stratification may occur due to inequality in the quantity and quality of continuous educational opportunities among social classes (Bang & Kim, 2003; Byeon & Kim, 2010). This study not only empirically analyzes whether education stratification is actually achieved by identifying and categorizing education and employment paths and identifying factors that determine each pattern, but also by exploring various variables of middle school students belonging to the patterns of education and employment paths.

This study aims to clarify the patterns and determinants of education and employment paths experienced by middle school students from 2004 to 2015.

First, the distribution of education and employment paths after graduating from middle school in 2004 of 3rd grade middle school students.

Second, find out the patterns of education and employment paths experienced by 3rd grade middle school students in 2004 until 2015.

Third, identify the determinants of the patterns of education and employment paths experienced by 3rd grade middle school students in 2004 until 2015.

II. Theoretical background

1. Career after middle school

Social cognitive career theory that can supplement this is attracting attention with the criticism that various context variables are not considered in career selection (Gillbert, Dancer, Rossman & Thorn, 1991; Swanson & Tokar, 1991; Lee, 1997). Social cognivitve theory emphasizes self-efficacy in relation to specific performance in career development and choice, and emphasizes integrated understanding of individual characteristics, environmental variables, and career decisions (Hackett & Lent, 1992). In particular, an individual's sense of self-efficacy and expectation of results are derived from learning experiences, which may be limited by the individual and environmental background. It is argued that such a mediating variable can act as a career barrier that prevents interest from leading to career goals or practices in social cognitive career theory, and that intervention to cope with this is necessary (Lent, Brown & Heckett, 2002).

2. Career decision factors by implementation stage

Looking at the factors that determine career paths in adolescence, there was a difference in career

depending on household variables such as monthly income, parental support, private education expenditure and personal variables such as gender, academic achievement, educational aspiration (Kim & Byun, 2006; Ahn & Lee, 2009; Lim, 2013; Song, 2009; Jeon, Lim & Seong, 2015). In particular, it was found that the higher the average monthly income and parental education, which are the family variables, the more they choose general high schools than vocational high schools, and this can be reduced by the student's academic achievement (Ahn & Lee, 2009; Kim & Byun, 2006). It has also been found that the socioeconomic background characteristics of such families can be reduced by the relationship between parents and children or educational support (Jeon, Lim & Seong, 2015). In addition to the household variables, it was found that women are more likely to enter vocational high schools than general high schools, and lower academic achievement and educational aspirations (Jeon, Lim & Seong, 2015; Kim & Byun, 2006). This shows that the family's monthly average income, parents' academic background, parents' educational support, gender, educational aspirations, and academic achievement in the process of going from middle school to high school are determinants of high school affiliate selection.

On the other hand, Kim and Byun(2006) found that in a study that empirically analyzed that educational stratification is taking place in Korean society, the higher the educational level and household income level of parents when adolescents go to higher school, the higher the student's academic achievement and It was found that the higher the level of educational aspirations, the more likely it is to enter university and the prestige of the university. In addition, it was confirmed that there were differences in the choice of university type and whether or not to enter university according to gender (Kim & Byun, 2006). Parents' socio-economic status affects the type of high school they go to, and the difference in high school education experience occurs due to the type of high school, and it has an effect on the SAT scores and the rank of college entrance, revealing the cumulative long-term effect of the education experience. (Kim & Kim, 2013). As a result of examining the above, it can be found that in adolescence, career decisions are greatly influenced by the socio-economic background of the family and the relationship with parents along with individual variables.

III. Research method

1. Population and target of analysis

The population of this study was students in the

Table 1. Variable setting and processing criteria

classification		Questionnaire
Education And Employment status	Educational institutions	Regular educational institutions attending the 2nd to 12th years, type
	Employment status	2nd~12th year Post graduation from a regular educational institution
Individual factors	gender	Gender
	Academic achievement	Ranking (%)
	Educational aspiration	Desired level of education
Household factors	Average monthly income	Average monthly household income
	Parents education level	Final academic background of parents
	Private education expenditure	Average monthly private education expenditure
	Communication about career with parents	Conversation on job, school, and department selection
	Parental expectation	Education aspirations for children

third year of middle school in 2004. For the analysis, data from the 1st year (2004)-12th year (2015) of the third grade middle school cohort of the Korean Education and Employment Panel were used. The Korean Education and Employment Panel survey started in 2004 and tracked the students for 12 years and surveyed the types of education and employment. In the first year (2004), 2,000 students' guardians, 1,112 homeroom teachers of the school to which the student belonged were also investigated, and household variables were surveyed among 2,000 third grade middle school students. This is appropriate to analyze the factors that determine the path by grasping education and employment paths, identifying the characteristics of students' individual and household variables for each path. Accordingly, in this study, out of 2,000 cohorts of third grade middle school students, 1482 respondents for 12 years of education and employment from the 2nd year to the 12th year.

2. Variable setting and processing

In this study, variables and items as shown in Table 1 were used to classify the paths and patterns of transition to education and employment after middle school, and to investigate the determinants of each pattern.

3. Data analysis

In this study, after graduating from middle school, the distribution of education and employment transition paths was identified. Through this, the optimal matching method was used to identify the representative patterns of the types of high school, university, and employment after middle school, and to specifically confirm the time series properties of each pattern. The optimal matching method is one of the various attempts for 'structuring of time' throughout social science since the 1980s, and is the event sequence analysis method proposed by Abbott
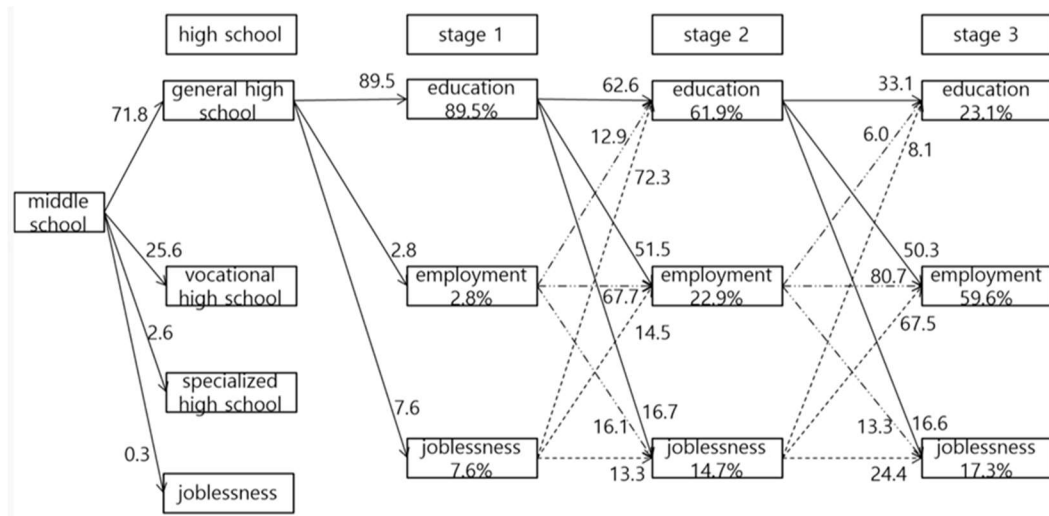
Figure1. Distribution of education and employment after middle school to general high school
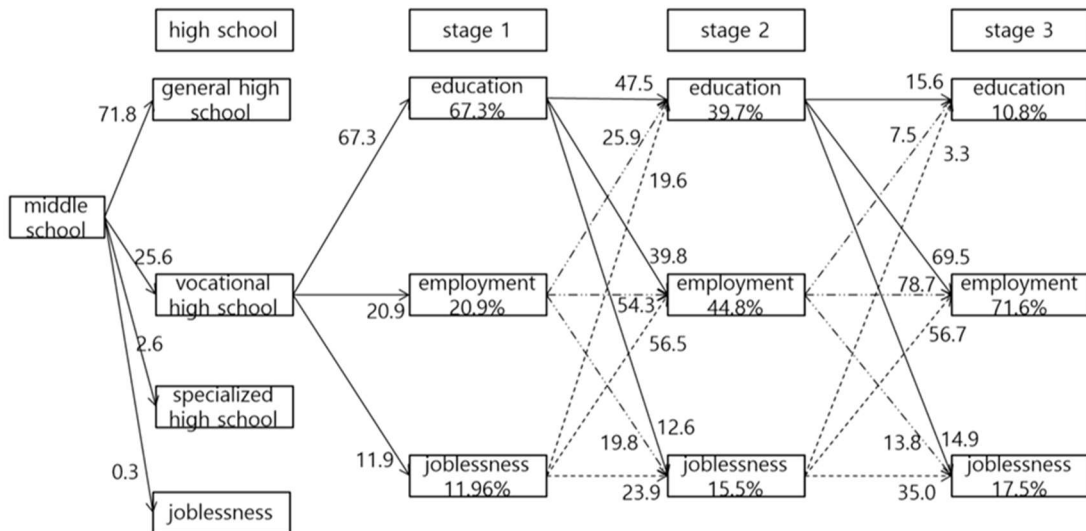
Figure2. Distribution of education and employment after middle school to vocational high school

(1995) to analyze the trajectory of time. In addition, cluster analysis was conducted based on the distance values between the array pairs derived through the optimal matching method, and a chi-square test was performed to confirm the determinants for each pattern of education and employment path. At this time, the TraMineR package of R studio 1.2.5033 was used as a statistical program for analysis.

In order to search for education and employment paths after graduation from middle school, the categories of education and employment status were classified, and each individual's education and employment status was coded on a yearly basis. At this time, 'non-response' means missing values due to military service or panel investigation failure/non-response. In one case, all non-response cases after high school and cases with non-

response for more than 6 years out of the total 12 years were deleted, and other cases were considered as 'non-response' and used for analysis.

IV. Results

1. Distribution of education and employment after middle school

Figure 1 and Figure 2 show education and employment paths after graduation from general high school and vocational high school, respectively. Special purpose high schools were excluded from the analysis because the number was small. The distribution was shown by categorizing them as 'education' if they were in a college, university, or graduate school, as 'employment' if they answered that they were employed, and if they answered that they did not have a job as 'joblessness'. In the first year of the survey, students who were in the 3rd grade of middle school enrolled in high school in the 2nd to 4th year, and this was analyzed by grouping it into the 'high school' stage. After graduating from high school, the education and employment period was different for each individual, and the stages were classified based on the responses. Of the total respondents, 533 students who had enrolled in colleges totaled 1856 years. As a result of adding up the actual enrollment period for each individual, the average enrollment period was about 3.5 years. In the case of university, 893 students were enrolled, and the total enrollment period was 4803 years, which was about 5.4 years. In this study, the data was recoded and the distribution was analyzed by dividing the data into stage 1 for 3.5 years of college enrollment after graduation from high school, stage 2 for the period from stage 1 to 5.4 years enrolled in university, and stage 3 for the remaining period. The numbers in the squares represent the percentage of people who are education, employment, and joblessness at that stage, and the arrows indicate which state transitions to each stage. The numbers around the arrows indicate the percentage of transition to education and employment status at each stage.

Through Figure 1 and Figure 2, we can find the following facts. The rate of graduating from vocational high school and transitioning to employment was 20.9%, which was higher than that of general high school (2.8%). Since then, even in stage 2 and stage 3, the percentage of employment status is high when graduating from vocational high school, indicating that the original purpose of vocational high school is well achieved.

And, in the case of vocational high schools, the rate of progressing from stage 1 to employment and then to education at stage 2 was 25.9%, which was higher than

that of general high schools. This can be seen as a result of a policy that allows them to get a job and receive education first after entering a vocational high school, such as the "Employment First, Advancement to University Later" policy in Korea.

2. Patterns of education and employment paths after middle school

Cluster analysis was conducted based on the distance between arrays for education and employment paths experienced by middle school students in 2004 until 2015. Among all third grade in middle school students cohort, all consistent non-response cases, non-response cases at high school level or after high school, dropout of the panel in the middle, and cases consistent with non-response for more than 6 years out of the 12th year were excluded from the analysis. In addition, cluster analysis was performed on a total of 1482 people, excluding the special high school, which is difficult to group into clusters due to their small number. Figure 3 shows the results of classifying the group into 5 patterns that are considered most appropriate through the dendrogram.

As a result of confirming through Figure 3, the characteristics of each type are as follows.

Pattern 1 is a case in which 317 (21.4%) have entered a vocational high school and then college or regular job. The proportion of students who fall into this pattern of students transition to regular employment increases, and the period of enrollment in colleges is not long.

Pattern 2 is a case where they go to a general high school and then go to a university, and non-responses in the middle, and then move to a university. It is confirmed that the transition period for this pattern to regular employment is later than that of other patterns.

Pattern 3 is a case where 535 students (36.1%) enter general high school and then go to a university and then transition to regular employment. This pattern is similar to pattern 2 except for the time when there is non-response in the middle, but it can be seen that the transition to regular employment is somewhat faster than pattern 2.

Pattern 4 is a case in which 322 students (21.7%) transition from general high school to college or study and work at the same time and then proceed to regular employment. Students who is this pattern are similar to pattern 1, but it is confirmed that the proportion of students who is pattern 1 who graduated from vocational high school has a higher proportion of regular employment.

Pattern 5 is a case where 72 students (4.9%) have transitioned to regular employment after entering a university in a vocational high school. It can be seen that the
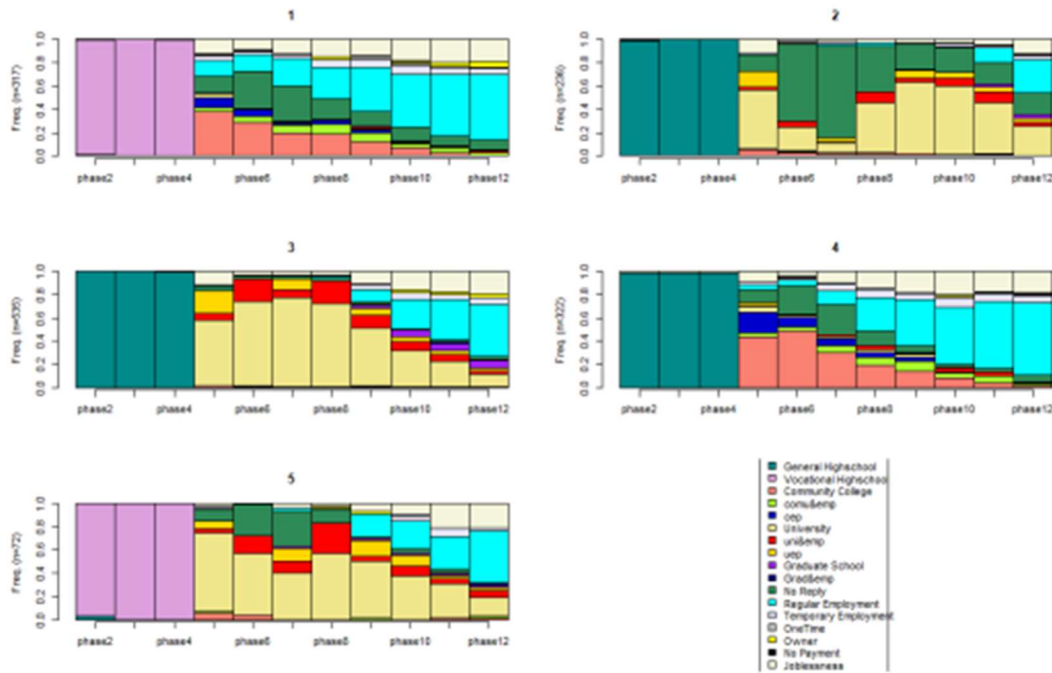
Figure 3. Patterns of Education and Employment status for 12 years

transition path of students in this pattern is similar to that of pattern 3 except for the period of high school education, but the rate of transition to regular employment immediately after graduation from high school is higher than that of pattern 3.

3. Determinants of types of education and employment paths after middle school

A difference test was conducted to determine whether the patterns of education and employment paths experienced by middle school students in 2004 until 2015 differed according to individual and household factors. Among the individual factors, gender, academic achievement, and educational aspiration were tested for differences, and household factors such as household average monthly income, parental education level, average monthly private education expenditure, career-related conversations between parents and children, and parents' educational aspirations of children. As a result, there was differences in factors were found.

1) Individual factors

(1) gender

A chi-square test was conducted to determine whether there are differences in the patterns of education and employment paths according to gender. As a result of the analysis, it is shown in Table 2. In particular, in the case of pattern 2, males accounted for a large proportion of 82.2%. In the case of pattern 2, it can be found that there is a period of non-response in the middle, and it can be inferred that this is due to military service, etc. In the case of pattern 3, females occupied more proportions than males. Except for non-response, it can be seen that the transition from general high schools similar to those of pattern 2 to university or entering regular employment is about two years earlier.

(2) Academic achievement

In order to find out whether the patterns of education and employment paths differ according to the academic achievement of the middle school period, an analysis of variance was performed by extracting the rank order percentage in the first year. The results of checking the normality and equal variance of the group were not satisfied, so the Kruskal-Wallis test was performed, and then the Bonferroni test was performed. The results are shown in Table 3. As a result of the post-test, there was a difference between the groups at the significance level

Table 2. Patterns of education and employment path by gender

Pattern	Gender($x^2 = 144.99$ ***)		Total
	Male	Female	
Pattern1	165(52.1)	152(47.9)	317(100.0)
Pattern2	194(82.2)	42(17.8)	236(100.0)
Pattern3	193(36.1)	342(63.9)	535(100.0)
Pattern4	140(43.5)	182(56.5)	322(100.0)
Pattern5	35(48.6)	37(51.4)	72(100.0)
Total	727(49.1)	755(50.9)	1482(100.0)

***p<.001

Table 3. Patterns of education and employment path by academic achievement

Pattern of education and employment		N	Mean	Std.dev	$x^2(df)$	Differences between groups
Academic achievement (Rank order percentage)	Pattern1	285	73.90	17.84	470.63***(4)	Pattern1>5>4>2,3
	Pattern2	195	37.41	21.94		
	Pattern3	486	32.60	22.11		
	Pattern4	284	50.16	23.01		
	Pattern5	65	61.19	21.94		

***p<.001

of .05 in the order of pattern 1, pattern 5, pattern 4, pattern 2 and 3, but the difference between patterns 2 and 3 was not statistically significant.

(3)Education aspiration

The education and aspiration conducted a chi-square test to reveal the differences in education aspirations according to the patterns of education and employment paths in anticipation of their level of education. As a result, it is shown in Table 4. Among all students, 70.8% of all students wishing to be educated to a university were not significantly different by patterns, but the proportion of pattern 1 was 55.5%, which was slightly lower than the total. In addition, it can be seen that in patterns 1 and 5, more students wishing to be educated to a college were higher than those of other patterns.

2) Household factor

(1) Average monthly income and private education expenditures

To find out whether there is a difference in average monthly income and private education expenditure according to the pattern of education and employment path, variance analysis was conducted by extracting the average monthly income and private education expenditure of middle school students in the first year. The results of checking the normality and equal variance of the group were not satisfied, so the Kruskal-Wallis test was performed, and then the Bonferroni test was performed. As a result, as shown in Table 5. As a result of the post-test, the average monthly income of households and private

Table 4. Patterns of education and employment path by education aspiration

Pattern of education and employment	Education aspiration($x^2 = 295.84$ ***)					Total
	High school	College	University	Mater	Doctor	
Pattern1	46(14.5)	84(26.5)	176(55.5)	5(1.6)	6(1.9)	317(100.0)
Pattern2	4(1.7)	12(5.1)	175(74.2)	23(9.7)	22(9.3)	236(100.0)
Pattern3	5(0.9)	13(2.4)	385(73.8)	68(12.7)	54(10.1)	535(100.0)
Pattern4	10(3.1)	28(8.7)	250(77.6)	22(6.8)	12(3.7)	322(100.0)
Pattern5	2(2.8)	13(18.1)	53(73.6)	1(1.4)	3(4.2)	72(100.0)
Total	67(4.5)	150(10.1)	1049(70.8)	119(8.0)	97(6.5)	1482(100.0)

***p<.001

Table 5. Patterns of education and employment path by income and private education expenditure

Pattern of education and employment		N	Mean	Std.dev	$x^2(df)$	Differences between groups
Average monthly income	Pattern1	310	213.3	115.27	130.94***(4)	Pattern2,3>4, Pattern2,3,4,5>1
	Pattern2	227	341.0	253.47		
	Pattern3	529	330.3	183.06		
	Pattern4	318	276.6	160.70		
	Pattern5	70	282.4	136.86		
Average private education expenditure	Pattern1	311	22.20	22.35	139.63***(4)	Pattern2,3>4, Pattern2,3,4,5>1
	Pattern2	229	47.73	42.66		
	Pattern3	533	45.93	36.20		
	Pattern4	320	34.53	29.16		
	Pattern5	70	34.07	29.23		

***p<.001

education expenditure of students in pattern 1 was significantly lower than that of the other patterns, and among them, the expenditure of private education expenditure of the group to which students in patterns 2 and 3 belonged was significantly higher than that of pattern 4.

(2)Parents' education level

A chi-square test was conducted to find out whether differences in parents' education level were found according to the student's education and employment pattern. A noticeable difference can be found in the case of college graduates with their parents' academic background in Table 6. In the case of fathers, 28.9% of them were college graduates or higher, and 13.8% of mothers were college graduates or higher, but patterns 1 and 4 showed a path to transition to a vocational college or regular job after graduation from high school. In the case of

Table 6. Patterns of education and employment path by parents' education level

Pattern of education and employment	Father's education level($x^2 = 128.13$ ***)				Total
	Elementary school graduate	Middle school graduate	High school graduate	University graduate	
Pattern1	24(8.7)	58(20.9)	165(59.6)	30(10.8)	277(100.0)
Pattern2	6(2.7)	13(5.9)	112(50.7)	90(40.7)	221(100.0)
Pattern3	17(3.3)	38(7.4)	261(50.8)	198(38.5)	514(100.0)
Pattern4	23(7.6)	40(13.2)	178(58.9)	61(20.2)	302(100.0)
Pattern5	3(4.4)	12(17.6)	33(48.5)	20(29.4)	68(100.0)
Total	73(5.3)	161(11.6)	749(54.2)	399(28.9)	1382(100.0)
Pattern of education and employment	Mother's education level($x^2 = 99.644$ ***)				Total
	Elementary school graduate	Middle school graduate	High school graduate	University graduate	
Pattern1	28(10.1)	75(27.2)	159(57.6)	14(5.1)	276(100.0)
Pattern2	11(4.9)	23(10.2)	144(64.0)	47(20.9)	225(100.0)
Pattern3	21(4.0)	63(12.0)	339(64.6)	102(19.4)	525(100.0)
Pattern4	19(6.2)	69(22.5)	196(64.1)	22(7.2)	306(100.0)
Pattern5	5(7.2)	16(23.2)	40(58.0)	8(11.6)	69(100.0)
Total	84(6.0)	246(17.6)	878(62.7)	193(13.8)	1401

***p<.001

pattern 5, where the majority of cases transition to a university after entering vocational high school, the proportion of fathers who have graduated from college was higher than all cases, and the cases of mothers were somewhat lower, but it was found to be higher than that of pattern 4.

(3) Parents' aspiration of child education level and career choice communication

A chi-square test was conducted to reveal the difference in the educational level of children desired by parents according to the pattern of education and employment path. As a result, it is shown in Table7. Among all parental respondents, 67.7% of respondents wanted their children to be educated to a university, followed by 15.5%. However, in the case of pattern 2 and 3, the most frequent cases of wishing to be educated to a university are the same, but the next, 12.6% and 14.0%, respectively, who wish to be educated to a graduate school doctorate, indicating that there is a difference from the total proportion. In addition, it can be seen that in the case of pattern 1, the proportion of those who wish to be educated to university is less than that of the whole, and that of the college is higher. In the case of pattern 5, the number of cases wishing to be educated to university was slightly higher than that of all cases, but the cases of wishing to be educated to a college were found to be higher than that of all.

A chi-square test was conducted to determine

Table 7. Patterns of education and employment path by parents' education aspiration

Pattern of education and employment	Parents' education aspiration($x^2 = 308.99$ ∗∗∗)					Total
	High school	College	University	Mater	Doctor	
Pattern1	26(8.4)	120(38.6)	160(51.4)	4(1.3)	1(0.3)	311(100.0)
Pattern2	2(0.9)	18(7.8)	166(71.9)	16(6.9)	29(12.6)	231(100.0)
Pattern3	2(0.4)	31(5.8)	375(70.2)	51(9.6)	75(14.0)	534(100.0)
Pattern4	13(4.1)	43(13.4)	242(75.6)	8(2.5)	14(4.4)	320(100.0)
Pattern5	1(1.4)	16(22.5)	50(70.4)	4(5.6)	0(0.0)	71(100.0)
Total	44(3.0)	229(15.5)	993(67.7)	83(5.7)	119(9.1)	1467(100.0)

***p<.001

Table 8. Patterns of education and employment path by communication about career with parents

Pattern	Career choice communication with parents($x^2 = 29.939$ ∗∗∗)		Total
	Communicating	Not communicating	
Pattern1	245(77.3)	72(22.7)	317(100.0)
Pattern2	201(85.2)	35(14.8)	236(100.0)
Pattern3	480(89.7)	55(10.3)	535(100.0)
Pattern4	258(80.1)	64(19.9)	322(100.0)
Pattern5	65(90.3)	7(9.7)	72(100.0)
Total	1249(84.3)	233 (15.7)	1482

***p<.001

whether there is any difference in education and employment patterns according to the communications about career choices between students and parents. As a result, it is shown in Table 8. The number of students in pattern 1 and 4 who said they had communications about career choices with their parents was 77.3% and 80.1%, respectively, less than the overall average.

V. Conclusion and discussion

This study explored the patterns of education and employment paths after graduation in the 3rd grade middle school cohort using time series data up to the 12th year of the Korean Educational Employment Panel (KEEP). The third grade of middle school is the time

when career decisions begin, and the search for the path and the determinants after graduating middle school can have important implications for career guidance in the middle school period. The summary of the research results that can be identified in this study is as follows.

First, the distribution of education employment after middle school differs according to the type of high school. Vocational high school, the rate that leads to employment is high, and the rate of admission after employment is high, indicating that the original purpose was achieved.

Second, as a result of cluster analysis of education and employment paths after middle school, it could be classified into 5 patterns, vocational high school-

college-regular employment, general high school-university & unknown-regular employment, general high-university-regular employment, general high school-college-regular employment, vocational high school-college-regular employment.

Third, significant differences were found in gender, academic achievement, educational aspiration, monthly average income and private education expenditure, parents' academic background, parents' aspiration of children's education, and career choice communication with parents for each pattern of education and employment path. It can be seen that this shows the same pattern as the factors of career decision for each stage of transition to higher schools suggested in previous studies.

Some implications based on the research results are as follows. First, since the pattern of high school affects the later education and employment path, it is necessary to provide information on the path after high school in the career guidance of middle school students. In particular, when entering a general high school or a vocational high school, the college to which they enter the school will be different, or the timing of transition to the professional world will be different. In this study, only information on employment status is provided, but it is necessary to further analyze the performance of the labor market in terms of what type of occupation and wages are among regular workers.

Second, since the individual characteristics and family characteristics of each individual can affect the patterns of education and employment paths, the characteristics of individuals and families should be identified and career guidance accordingly should be made. At the individual level, it is important to ensure that students have an educational aspiration that suits them, and at the family level, it is important to enable students to find a career that suits them themselves through career-related conversations between parents and children.

Third, Korea Education Employment Panel Survey, which is the data analyzed in this study, was the last 12th year until 2015, and the Korean Education Employment Panel 2 is currently in progress, so the subject of the survey was changed. The period of 12 years after middle school may be a rather short period for analysis of employment performance. Therefore, long-term follow-up will need to be conducted to attempt to explore longer-term education and employment paths.

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Vocational Behavior of Japanese Newcomer and Internship Experience

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Abstract This study examines the relationship between Japanese newcomer`s vocational behavior and internship experience. Internship in Japan defined as "Students perform work experience related to their major or future career while in university (MEXT, MHLW, and METI, 2014)". However, in this definition, internship and cooperative education are confused, and there are various internships are conducted. Furthermore, most of the effects of internships in Japan are aimed at employment. Therefore, the effects of various internship experience on organizational socialization are not considered. In order to examine the effects of internship experience on organizational socialization, this study conducted the internet survey of 497 newcomer. We performed cluster analysis to classify the internship experience. Cluster analysis revealed four clusters. Furthermore, one-way ANOVAs revealed that diversity of internships in Japan, and differences in their effects. In particular, it was indicated that those who have more practical experience as internship experience contents are more likely to have vocational behavior, especially proactive behavior, in the current company.

Keywords Internship experience, Japanese newcomer, Proactive behavior, Organizational socialization, Cluster analysis

1. Introduction

This study examines the relationship between Japanese newcomer`s vocational behavior (i.e., proactive behavior, vocational competencies, commitment, and job satisfaction) and internship experience contents. Internship in Japan defined as "Students perform work experience related to their major or future career while in university (MEXT, MHLW, and METI, 2014)". However, in this definition, internship and cooperative education are confused. Cedercreutz & Cates (2010) describes about cooperative education that "an educational methodology in which periods of classroom instruction alternate with periods of paid discipline-related work experience. Co-op students typically participate in a school-work rotation that may span over as many as three academic years throughout their undergraduate education". Wallace (2020) also describes that internships require academic credits and multiple semesters. In Japan, these are confused and are called "internships". Furthermore, most of the effects of internships in Japan are aimed at recruitment (e.g. Takara, & Kinjo, 2001; Kameno, 2011). In addition, most internships are short-term (about 1 to 2 weeks), and there are various

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internship contents are conducted. Therefore, the effects of various internship experience contents on organizational socialization are not considered. Organizational socialization is about new beginnings-individuals starting new jobs within an organizational context (Wanberg, 2012).

Examining the impact on organizational socialization will lead to a new perspective on the effects of various internship contents conducted in Japan. In particular, the process of transition from school to work in Japan is unique (e. g., collective recruitment of new graduates, that is, recruitment of new graduates who have no work experience), and it is not premised on internships at companies that will join the company in the future. Despite this, the current situation is that internships are required to be enhanced (METI, 2014; MEXT, 2017). Furthermore, few studies have examined how the content of internship experience during university is related to the vocational behavior of new employees. Therefore, it is necessary to consider the relationship between internship experience contents at the university and proactive behavior in new employees. In particular, proactive behavior in vocational behavior promotes organizational socialization. Proactive behavior defines as anticipatory action that employees take to impact themselves and/or their environments (Grant & Ashford, 2008). Proactive behavior has multiple dimensions (Ashford & Black, 1996; Grant & Ashford, 2008). That dimensions include behavior (information seeking, networking, and feedback) that is expected to be related to internship experience contents. Focusing on these variables will be useful in understanding the effect of internship experience contents on organizational socialization.

In order to examine the effects of internship experience contents on organizational socialization, this study will conduct a survey of new employees. We propose to following hypotheses:

Hypothesis 1: Newcomer can be categorized into multiple types based on their internship experience contents.

Hypothesis 2: Newcomer`s vocational behavior will differ with the type of internship experience contents.

2. Method

2.1. Sample and procedure

Participants were collected using the Internet survey service "QuickMill" of Macromill, Inc. We collected data for Japanese newcomer so that the internship experience period (inexperienced, 1 day, 1 week to 1 month, 1 month or more) is even. A total of 497 participants were completed this survey. Participants comprised 123 men (25%) and 374 women (75%). Their mean age was 23.44 years (SD=0.757). The participant's internship experience period identified as 26% inexperienced, 26% 1 day, 26% 1 week to 1 month, and 22% 1 month or more. The survey was conducted from January 6th to 17th, 2019.

2.2. Measures

2.2.1. Internship experience

Internship experience in university was measured using 9-item, which items were generated for the purpose of this study (e.g.," Company information session"," Problem-solving issues"," Same job description as employees"). All items were answered on 4-point scale (1 = not applicable, 4 = apply).

2.2.2. Skill diversity and Job freedom in internships at university

We used the Skill diversity and Job freedom scale (Sekiguchi, 2010). Skill diversity consisted of 4 items (α = 0.89), and Job freedom consisted of 3 items (α = 0.82). All items were answered on 4-point scale (1= not applicable, 4=apply).

2.2.3. Proactive behavior

Information seeking about work preparation, information seeking about organizational culture, networking, and feedback were measured. Information seeking about work preparation (13-items) and information seeking about organizational culture (5-items) were measured using scales from Miho & Matsuo (2019). Cronbach's α coefficients were 0.92, 0.82. Networking (4-items) were generated based on Ogata's (2016) scales. Cronbach's α coefficients were 0.79. Feedback (4-items) were generated based on Ogawa (2012) and Hoshi's (2016) scale. Cronbach's α coefficients were 0.77. All items were answered on 4-point scale (1 = not practicing, 4 = practicing).

2.2.4. Reality shock

Reality shock define as a psychological phenomenon that occurs when the expectations and images formed before entering an organization are different from the reality after entering the organization, and it has a negative impact on the organizational commitment and socialization of newcomers (Ogata, 2012). We generated 12-items based on Ogata's (2012) scales. All items were answered on 4-point scale (1 = negative, 4 = positive). EFA revealed two factors that job (5-items) and interpersonal relations (6-items). Cronbach's α coefficients were 0.80, 0.80.

2.2.5. Vocational competencies

Job management (8-items) and communication (8-items) were measured. We used Yamamoto, Miho & Terada's (2017) scales. All items were answered on 4-point scale (1 = incapable, 4 = capable). Cronbach's α coefficients were 0.84, 0.81

Table 1
Means, standards deviations (SD), and corelations

	Means	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Information seeking about work preparation	2.71	0.63													
2. Information seeking about organizational culture	2.47	0.68	0.726**												
3. Networking	2.64	0.70	0.499**	0.458**											
4. Feedback	2.86	0.66	0.480**	0.322**	0.616**										
5. Reality shock about job	2.64	0.61	0.383**	0.400**	0.360**	0.343**									
6. Reality shock about interpersonal relations	2.90	0.57	0.342**	0.236**	0.408**	0.464**	0.572**								
7. Job management	2.70	0.55	0.464**	0.398**	0.550**	0.508**	0.343**	0.299**							
8. Communication	3.05	0.54	0.411**	0.279**	0.421**	0.521**	0.222**	0.329**	0.728**						
9. Commitment	2.40	0.81	0.413**	0.425**	0.404**	0.351**	0.688**	0.443**	0.348**	0.219**					
10. Retention	2.48	0.91	0.325**	0.287**	0.271**	0.300**	0.599**	0.390**	0.302**	0.238**	0.743**				
11. Learning at work	2.67	0.71	0.625**	0.489**	0.485**	0.469**	0.443**	0.330**	0.537**	0.384**	0.487**	0.409**			
12. Job satisfaction	2.51	0.72	0.393**	0.324**	0.369**	0.376**	0.626**	0.508**	0.322**	0.267**	0.773**	0.746**	0.421**		
13. Skill diversity in internship (N=368)[a]	2.70	0.77	0.208**	0.140**	0.230**	0.313**	0.196**	0.212**	0.258**	0.266**	0.227**	0.174**	0.253**	0.194**	
14. Job freedom in internship (N=368)[a]	2.51	0.74	0.249**	0.248**	0.206**	0.241**	0.197**	0.213**	0.218**	0.212**	0.260**	0.183**	0.214**	0.226**	0.536**

Note. p **< 0.01 N=497 [a] Skill diversity and Job freedom in internships at university were answered only by participants who had internship experience.
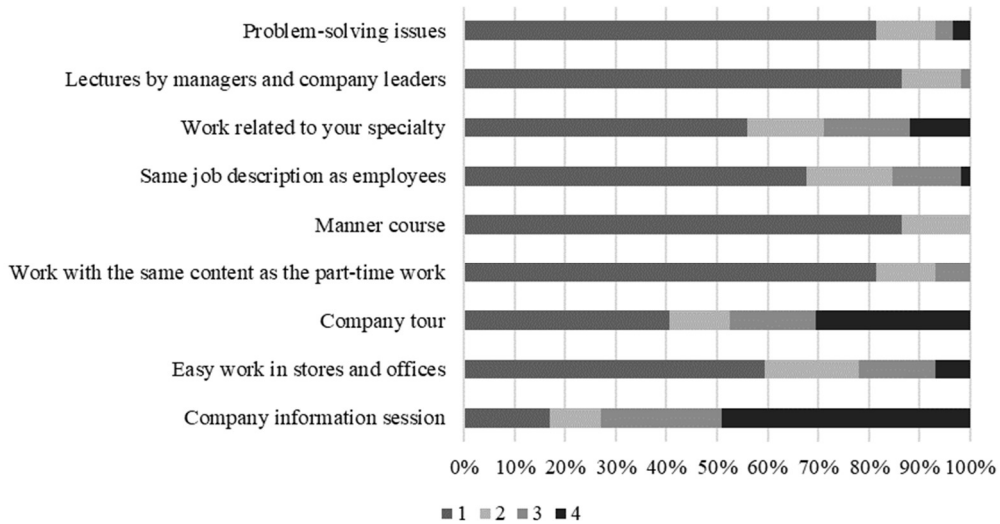
Figure 1. Internship experience contents in cluster 1.
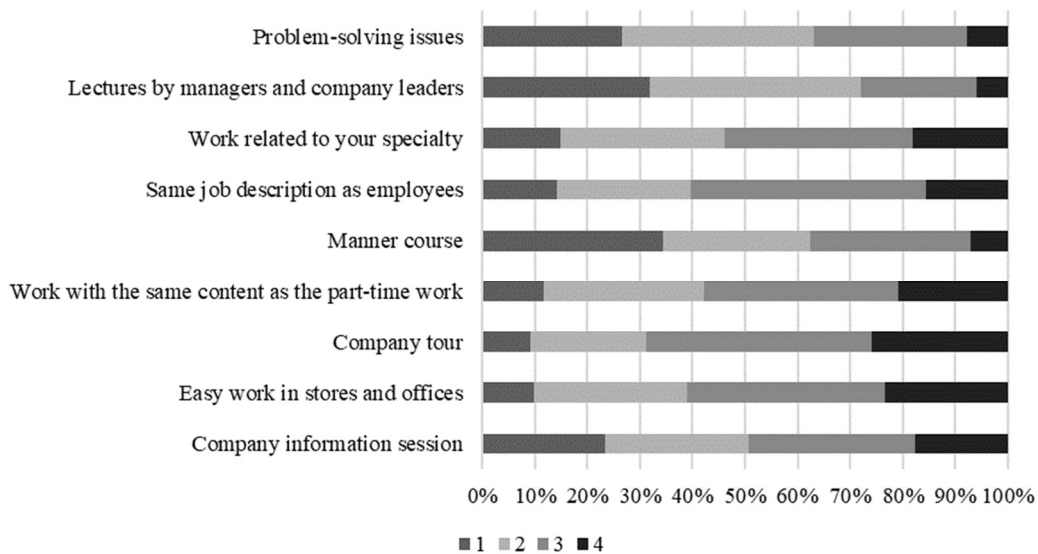
Figure 2. Internship experience contents in cluster 2.

2.2.6. Commitment, retention, learning at work, and job satisfaction

Commitment (5-items), retention (2-items), learning at work (5-items), and job satisfaction (5-items) were measured using generated items based on Ogawa (2005) and Suzuki's (2002) scales. All items were answered on 4-point scale (1 = not applicable, 4 = apply). Cronbach's α coefficients were 0.91, 0.77, 0.87, and 0.83.

2.3. Analytic strategies

Our hypothesis was tested in two steps using IBM
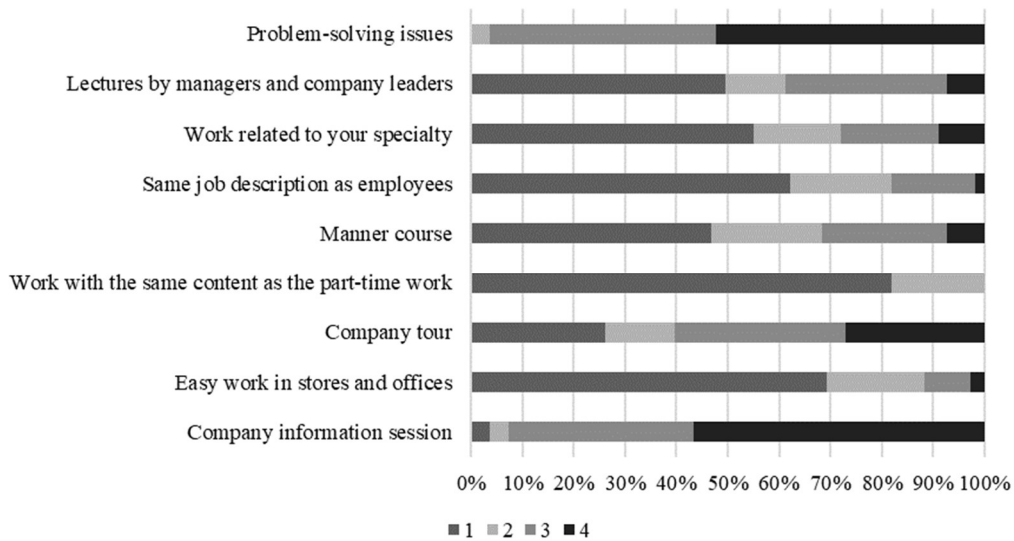
Figure 3. Internship experience contents in cluster 3.
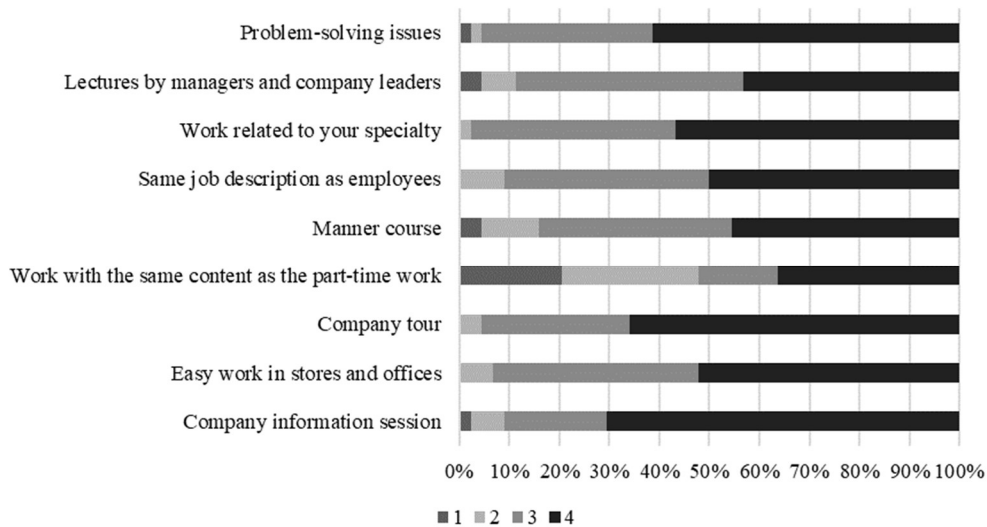
Figure 4. Internship experience contents in cluster 4.

SPSS Statistics 26.0. First, we conducted cluster analysis using internship experience in university as an independent variable and categorized newcomers. Ward's method was applied in the cluster analysis. Second, we labelled the clusters. Additionally, we performed an analysis of variance (ANOVA) to verify significant differences among the clusters.

3. Results

We report means, standards deviations, bivariate correlations for all the study variables in Table 1. Table 1 reveals, that proactive behavior (information seeking about work preparation, information seeking about

Table 2
One-way ANOVAs results

	Cluster 1	Cluster 2	Cluster 3	Cluster 4		
Proactive behavior						
1. Information seeking about work preparation	2.58	2.80	2.75	3.09	$F(3, 364) = 6.661, p < .001$	4 > 3,2,1
2. Information seeking about organizational culture	2.25	2.60	2.45	2.94	$F(3, 364) = 10.408, p < .001$	4 > 3,2,1; 2 > 1
3. Networking	2.56	2.62	2.63	3.15	$F(3, 364) = 8.176, p < .001$	4 > 3,2,1
4. Feedback	2.76	2.76	2.99	3.32	$F(3, 364) = 11.181, p < .001$	4 > 3,2,1; 3 > 2
Reality shock						
5. Reality shock about job	2.51	2.70	2.55	3.00	$F(3, 364) = 7.216, p < .001$	4 > 3,2,1
6. Reality shock about interpersonal relations	2.86	2.87	2.99	3.14	$F(3, 364) = 3.464, p < .05$	4 > 2
Vocational competencies						
7. Job management	2.62	2.68	2.74	3.07	$F(3, 364) = 6.835, p < .001$	4 > 3,2,1
8. Communication	2.94	2.98	3.17	3.35	$F(3, 364) = 8.128, p < .001$	4, 3 > 2,1
9. Commitment	2.34	2.53	2.44	3.07	$F(3, 364) = 15.107, p < .001$	4 > 3,2,1; 2 > 1,3
10. Retention	2.35	2.52	2.34	3.06	$F(3, 364) = 7.615, p < .001$	4 > 3,2,1
11. Learning at work	2.59	2.76	2.58	3.21	$F(3, 364) = 10.203, p < .001$	4 > 3,2,1
12. Job satisfaction	2.34	2.53	2.44	3.07	$F(3, 364) = 10.704, p < .001$	4 > 3,2,1
13. Skill diversity in internship	2.45	2.60	2.76	3.26	$F(3, 364) = 11.644, p < .001$	4 > 3,2,1
14. Job freedom in internship	2.24	2.40	2.62	3.04	$F(3, 364) = 13.397, p < .001$	4 > 3,2,1; 3 > 1

organizational culture, networking, and feedback) is significantly correlated with other all variables.

3.1. Cluster analysis

Cluster analysis suggested a four-cluster solution. Cluster 1, the "company information session" cluster, included 16% of participants who had internship experience (N=59). The pattern of internship experience in cluster 1 shows Fig.1. In cluster 1, the percentage of those who answered 3 (somewhat applicable) and 4 (apply) to the internship experience were 47% at "company tour" and 73% at the "company information session". Cluster 2, the "work experience" cluster (Fig. 2), included 42% of participants who had internship experience (N=154). In cluster 2, the percentage of those who answered 3 (somewhat applicable) and 4 (apply) to the internship experience were 54% at the "work related to your specialty", 60% at "same job description as employees", 58% at "work with the same content as the part-time work", 69% at "company tour", 61% at "easy work in stores and offices" and 49% at "company information session". Cluster 3, the "workshop" cluster, included 30% of participants who had internship experience (N=111). In cluster 3 (Fig. 3), the percentage of those who answered 3 (somewhat applicable) and 4 (apply) to the internship experience were 93% at the " company information session", 60% at "company tour", and 96% at the "problem-solving issues". Cluster 4, the "corporate practice" cluster, included 12% of participants who had internship experience (N=44). In cluster 4 (Fig. 4), more than 50% of participants answered 3 (somewhat applicable) and 4 (apply) for all variables in internship experience.

3.2. Analysis of variance (ANOVA)

One-way ANOVAs results showed that there were significant differences all variables (Table 2). The means value of proactive behavior (information seeking about work preparation, information seeking about organizational culture, networking, and feedback) in Cluster 4 was significantly higher than cluster 1, 2, 3. Additionally, the mean value of information seeking about organizational culture in cluster 1 was significantly lower than cluster 2 and 3, F(3, 364) = 6.661, p<.001. The mean value of feedback in cluster 3 was significantly higher than cluster 1 and 2, whereas lower than cluster 4, F (3, 364) = 11.181, p<.001. The mean values of reality shock about job, and job satisfaction in cluster 4 were significantly higher than cluster 1, 2, 3. Furthermore, cluster 4 had higher the mean values of reality shock about interpersonal relations than cluster 2. Commitment were cluster 4 higher than other clusters, and cluster 2 scored higher than clusters 1 and 3, F (3, 364) = 15.107, p<.001. Job management in cluster 4 were higher score than other clusters, and communication in cluster 3, 4 were higher score than cluster 1 and 2.

4. Discussion

4.1. Type of internship experience contents

In this study, we revealed four types of internship experience contents by cluster analysis. In this regard, Hypothesis 1 of this study was supported. Cluster 1 and 3 contained 46% of the people, and the experience content was a "company information session" and

"workshop" type. These experience contents were different from the internship defined by MEXT et al (2014) and Wallace (2020). On the other hand, cluster 2 and 4 were of the "work experience" and "corporate practice" types, and were provided work experience. It is assumed that the experience contents of cluster 2 is similar to the internship defined by MEXT et al (2014), and the experience contents of cluster 4 is similar to the internship defined by Wallace (2020). Although there are various internships conducted in Japan, it was revealed that contents different from the definition of MEXT et al (2014).

Essentially, the experience contents of clusters 1 and 3 should not be called an "internship." The background to this is thought to be the unique employment pattern in Japan. One of the Japanese-style employment practices is the collective recruitment of new graduates. In Japan, it is common to employ students who have no work experience and educate them in company. In addition, Students employment as soon as graduate from school. Therefore, Students don't have a sufficient understanding of work while students in school. This is also related to the lack of vocational education in Japanese school. In order to find a job in such a situation, it performs the same thing as the company information session, and may call that an internship. Clusters 1 and 3 are typical examples.

4.2. Internship experience contents and newcomer`s vocational behavior

The vocational behavior of new employees was different according to the difference in internship experience contents. In this regard, Hypothesis 2 of this study was supported. In particular, the values of all variables in cluster 4 were significantly higher than in the other clusters. In Cluster 4, participants had experience corporate practice as the internship experience contents. Cluster 4 participants have not experienced an internship at the current company. However, the experience contents of the internship were similar to what the new employee experienced. The above points may be related to that the scores of proactive behaviors, reality shock, vocational competencies, commitment, retention, learning at work, and job satisfaction were higher than those of other clusters. The reason why the reality shock score was high is probably because the internship experience contents was more practical than other clusters. It is possible that the reality shock was increased by gaining a realistic perspective on work through practical experience.

There was not much difference in scores between clusters 1, 2 and 3. The content of the internships conducted in clusters 1, 2 and 3 had fewer elements of work experience than in cluster 4. Most of the internships conducted in Japan correspond to clusters 1, clusters 2, and clusters3. Furthermore, most of the effects of internships in Japan are aimed at recruitment. Therefore, it may be effective in terms of understanding the company, but it does not seem to have much influence on the vocational behavior in the current company.

The interesting result of this study was cluster 4. The company that experienced the internship is different from the current company, but it is feature that the vocational behavior in the current company was actively carried out by experiencing the same work as the new employee. There are few types of internships like Cluster 4 in Japan. However, the effectiveness of more practical internships was suggested because it affects the vocational behavior and organizational socialization of the current company. These findings will be useful in promoting career education and vocational education in Japan.

4.3. Limitations and future research

In this study, it was indicated that those who have more practical experience as internship experience contents are more likely to have vocational behavior, especially proactive behavior, in the current company. Proactive behavior promotes organizational socialization. Therefore, this result may be influenced by the experience of organizational socialization through the content of the internship experience. However, the results of this study are a survey of past internship experience contents for new employees, so they are not a longitudinal survey of what kind of internship experience affects current vocational behavior. In order to examine the effects of internship experience contents in relation to vocational behavior after joining the company, it will be necessary to conduct a longitudinal survey. In addition, although it was not included in the analysis in this study, it is necessary to consider the term of the internship and the effects of academic credits.

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Determinants of Youth Paid Worker's Job Satisfaction Using the Decision-Making Tree Analysis

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Abstract The purpose of this study was to find out the level of job satisfaction and the determinants of youth paid workers in Korea. The analysis targets 1,964 paid workers aged 19 to 39 who were included in the 21st 'Korean Labor & Income Panel Study' surveyed in 2018. The main results are as follows: First, the general characteristics of youth paid workers are generally higher in health status and life satisfaction than the normal level. In addition, the average monthly wage was about 2.6 million won, higher than the median wage of 2.2 million won. Second, the job satisfaction among youth paid workers was higher than the normal level, and satisfaction with the content of their work was the highest. Third, the variables that most significantly affect job satisfaction of youth paid workers were life satisfaction, in addition to skill-job match, education-job match, employment type, an average monthly wage, average working hours per week, health status, and public sector employment were determinants. In particular, it was found that youth paid workers with high satisfaction in life and regular employment patterns and working in the public sector were the most satisfied with their jobs. On the other hand, the group with the lowest job satisfaction is when it is recognized that the life satisfaction is below average and over skilling.

Keywords Youth paid worker, Job satisfaction, Decision-making tree analysis, Korean Labor & Income Panel Study(KLIPS)

Introduction

In addition to the global economic crisis, Korea has become a serious social problem due to employment-free growth (Park, 2011). These employment instability issues have been common not only in Korea but also in advanced industrialized countries around the world, including Germany, Italy, Japan, France, and the Netherlands (Moon, 2013). Such a prolonged economic slump is particularly affecting young people This is because young people entering the labor market have less accumulated human capital and working experience compared to other age groups, making them relatively vulnerable to the employment environment. (Park, 2011). In Korea's labor market, there are no positive signs of economic performance both internally and externally, and the employment situation of young people classified as vulnerable is becoming more unfavorable at a time when income inequality is deepening (Kim & Choi, 2017). The employment situation of young people stands out in the quality of youth jobs, with the average length of their first job serving in Korea standing at only 19 months and only 62 percent of their one-year retention rate (Kim & Choi, 2017). The main reasons for this were dissatisfaction with duties such as remuneration and

working hours (Kim & Choi, 2017). In particular, job satisfaction is a major variable in determining the performance of employment (Baek & Hwang, 2009), in which the organization to which the individual belongs relates to performance and the quality of life of the individual (Gang & Moon, 2010). Thus, job satisfaction among youth paid workers can be seen as an important factor for both individuals and organizations and is of great significance in that it provides a basis for human resource management policies. Despite this importance, however, there is a lack of empirical research to identify factors that distinguish highly satisfied workers through a combination of factors that determine job satisfaction for youth paid workers.

Research purpose and objectives

The purpose of this study is to find out the level of job satisfaction and determinants of paid workers among young people by utilizing the Korean Labor & Income Panel Study. In order to achieve the objectives of these studies, the following detailed research objectives were established

(a) To identify the general characteristics of youth paid workers

(b) To identify the level of job satisfaction of youth paid workers

(c) To identify determine factors that primarily affect the job satisfaction of youth paid workers are identified.

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Review of literature

Youth paid workers in South Korea

Youth paid workers receive state-of-the-art school education and enter the labor market, while advanced knowledge and technology of young people act as drivers of economic development (Choi, 2015). The age of young people is defined in various ways, and first, the National Statistical Office suggests that both men and women aged between 15 and 29 are young people. Under the Youth Basic Law enacted this year, both men and women aged 19 to 34 are considered young. Meanwhile, in general, young people are described mainly in their 20s and 30s by age (Choi, 2015), and the youth standards of the Presidential Youth Commission, launched in 2013, are considered policy targets for both men and women aged 19 to 39. Recently, various expressions referring to the nation's youth have emerged. Among them, the term "Sampo Generation," meaning giving up dating, childbirth, marriage, relationships, and home-building, and the term "Chilpo Generation," referring to those who gave up their dreams and hopes (Lee et al, 2017). These newly coined words can be said to describe the current instability of Korean youth (Lee et al, 2017). In particular, more than six out of ten paid workers aged 15 to 29 who were employed in 2015 were found to be non-regular workers, despite a fairly high level of education internationally, up 10 percent from eight years ago (Kim & Choi, 2017). This suggests that youth paid workers are exposed to unstable employment. In fact, a relatively large number of young people are working as non-regular workers, and the wage gap between young and young people is gradually increasing (Jang, 2017), and even if young people succeed in finding jobs, many are likely to become non-regular workers (Lee et al, 2017). In addition, youth paid workers are very likely to experience many trial and error changes in their search for jobs and are characterized by voluntary aspects as well as involuntary factors such as restructuring (Choi, 2015).

Job satisfaction determinant

The definition of job satisfaction has not been generalized to this day, as the definition of job satisfaction continues to differ among scholars. And while the job satisfaction research has been studied with interest in the field of industrial and organizational psychology, the method of analyzing job satisfaction is diversifying into factors and concept differences (Lee, 2016).

The determinants of job satisfaction should be examined in a multi-dimensional manner, such as the concept of determining factors. According to a prior study by Lee (2010), the study presented two factors: gender, age, household income, educational background, marriage, and workplace characteristics: the size of work, type of work, presence of trade unions, and wage. In the study by Lee and Heo (2008), individual characteristics such as gender, career, motivation for choice, union membership, and participation in decision making were presented as environmental factors such as workplace size, decision participation, and burden of work. Bae and Lee (2008) divided the factors affecting job satisfaction into four categories: human attributes, working condition attributes, social welfare benefits factors, and job suitability and organizational immersion. In terms of human attributes, gender, age, marital status, academic background, occupation, and occupation, wages, working hours, job safety, vocational training status, union membership, industry, social welfare benefits factors, legal welfare, corporate welfare, social insurance subscriptions, and job suitability and organizational immersion were presented. Park (2011)'s study divided the factors affecting job satisfaction into four categories: demographic characteristics, human capital characteristics, working conditions characteristics and job characteristics. Among the demographic characteristics, marriage status, housing occupancy type, health status, family life satisfaction, holiday leisure time, human capital characteristics include academic background, career choice value, employment education and training, qualification, whether or not a person has a job size, public sector employment, labor union status, monthly average wage, full-time status, regular working hours, and job characteristics, major mismatch, education and skill matching. Moon (2013) said, "The type of employment, choice, gender, age, marriage, education level, wages and size of business affect job satisfaction".

When it comes to how many factors set up in the preceding study affect job satisfaction, first of all, women generally showed high job satisfaction, even though they had worse working conditions than men (Lee, 2010; Park, 2011). In addition, higher age, academic background, socioeconomic status, etc. showed a static impact on job satisfaction (Lee, 2009; Hwang & Baek, 2008). The result is that the higher the socioeconomic status of workers, the more likely they are to have good jobs by accumulating favorable human capital in the labor market, such as academic background and certificates. The qualifications and job training that form these human resources are also presented as having a static effect on job satisfaction (Park, 2011; Noh & Heo, 2011; Lee & Kim, 2002). In choosing a job, values also had a significant impact on job satisfaction, with young workers placing greater emphasis on intrinsic values that attach importance to the job itself than on external values

such as wages and working conditions (Lee & Lim, 2010).

Next, the larger the size of the workplace and the higher the level of job satisfaction (Lee & Lee, 2013) the more people worked in the public sector. In the case of labor unions, they showed a significant impact on job satisfaction (Cha & Joo, 2010). Non-regular workers who make voluntary choices are more satisfied with their jobs than non-regular workers who make involuntary choices according to their voluntary choices, and their wage levels are higher in the working environment (Cho & Kim, 2013; Lee & Lee, 2015). Finally, the higher the job and worker level of education and skill level, the more static the job satisfaction (Kim & Sung, 2016). Rather than formal specifications, job satisfaction is indicated by having the knowledge and skills necessary to perform a given task.

Based on the factors influencing job satisfaction presented in the preceding studies, the variables studied as determinants of job satisfaction for youth paid workers are gender, age, marital status, housing occupancy type, health status, life satisfaction, job type, wage, promotion opportunity, workplace size, labor union presence, working hours, public sector presence, employment type, workplace size, voluntary selection of non-regular workers, peer relationship, stress, professionalism, certificate presence, job selection values, education/skill-job matches, major-job matches.

Methodology

Date

The analysis targets 2,162 paid workers aged 19 to 39 years old, which were included in the Korean Labor & Income Panel Study (KLIPS) collected by the 21st Korea Labor Institute surveyed in 2018. The data from 1,964 respondents, excluding 198 respondents with responses and anomalies, were finally analyzed. The Korean Labor & Income Panel Study was the only labor-related household panel survey in Korea, and it was conducted until the 22nd survey in 2019 since the first survey was started in 1998, but the 22nd survey in 2019 was closed at the time of the study, so the 21st data was used.

Variable settings

Dependent and independent variables were set using the 21st data of the Korean Labor & Income Panel Study. Dependent variables were coded as the average values of nine questions, including wages or remuneration, job safety, the content of work, work environment, working hours, individual development potential, communication and human relations, fairness in personnel affairs, and satisfaction with welfare benefits. The independent variable was selected by comparing the relevant variables of the determinants of job satisfaction and the data included in the 21st Korean Labor & Income Panel Study. The independent variables set up to include 17 in total: gender, marital status, age, health status, life satisfaction, academic background, qualification, employment type, labor union status, regular working hours, social insurance payment status, monthly average wage, voluntary selection of non-regular workers, education-job matches, and skill-job matches.

Data analyses

The data analysis was performed using the Windows SPSS 23.0 program to analyze technical statistics and to analyze decision trees. The statistical significance level was set at 5%, the maximum tree depth was set at 5 levels for the brevity of the predictive model, and the number of cases of parent node was set at 30 and the number of cases of child node was set at 10.

Results

The general characteristics of youth paid worker

Gender was 56.6 percent for men and 43.4 percent for women, with 38.4 percent for those in their late 30s. In addition, those who graduated from college or higher (49.9%), those who graduated from high school or lower (32.6%), and those who graduated from college (17.4%). In addition, unmarried people (51.7%) and married people (48.3%) were similar, and health conditions and life satisfaction were higher than the normal level. Also many did not hold certificates (98.4%) and employment types accounted for 77.5 percent of regular workers, compared with 22.5 percent for non-regular workers. Most of them had no experience in vocational education and training (90.6%), many were working in private institutions (87.9%), had no experience in social insurance (98.1 percent), and were found to work in jobs without labor unions (81.5%). On the other hand, most of them voluntarily chose irregular workers (84.1%) and on average, the average monthly wage was about 2.6 million won, and the weekly working hours were about 41 hours. In addition, education-job match was 88.6% for the match group and 9.3% for the over education group. and skill-job match was also found to be 89.7% match groups and 8.5% over-skill groups.

Table 1: The level of job satisfaction of youth paid worker

Job satisfaction sub-constructs	Mean	SD	Minimum	Maximum
Wage or remuneration	3.09	0.67	1.00	5.00
Job safety	3.48	0.63	1.00	5.00
The content of work	3.56	0.58	1.00	5.00
Working environment	3.47	0.60	1.00	5.00
Working hours	3.46	0.66	1.00	5.00
Individual development potential	3.36	0.61	1.00	5.00
Communication and human relations	3.46	0.58	1.00	5.00
Fairness of personnel performance	3.23	0.55	1.00	5.00
Welfare and the welfare system	3.12	0.70	1.00	5.00
Total	3.36	0.46	1.00	5.00

N=1,964, SD: standard deviation

The level of job satisfaction of youth paid worker

The level of job satisfaction for youth paid workers(N=1,964) is as shown in Table 1. The average job satisfaction level was 3.36 higher than normal, and the highest satisfaction level was 3.56 on average. In detail, the average content of the work was 3.56, the average job safety was 3.48, the average work environment was 3.47, working hours was 3.46, communication and human relations was 3.46, the individual development potential was 3.36, the fairness of personnel performance was 3.23, the welfare and the welfare system was 3.12 and the wage or remuneration was 3.09.

Determinants of job satisfaction for youth paid worker

The model of the decision-making tree of the job satisfaction level of the paid worker of the youth is shown in Figure 1. The average job satisfaction level of all youth paid workers was 3.36, not very high, and it was shown that it rose to 3.75 (node 11) or 2.86 (node 4) depending on the interaction of various variables. In addition, the predictors for determining job satisfaction were life satisfaction, skill-job matches (over skill), education-job matches (over education), type of employment, average monthly wage, average working hours per week, and health status.

Meanwhile, the analysis of the risk chart to assess the validity of the decision tree model shows that the risk estimate is 0.143 and the standard error is 0.006, and about 85.7% is properly separated by the decision tree. Risk estimates represent the risk of misclassification or misprediction by decision tree analysis, and the smaller

the risk estimate, the more successful the model construction is (Jung, Lee, Kwon, 2018). The risk estimate in this study was lower than the previous research (Yang, Kim, Nam, 2011; Oh & Oh, 2018) using decision tree analysis, which makes the construction model fit validate.

The relative importance of determining the job satisfaction of youth paid workers is as shown in Table 3. The number of separation rules indicates how many times the variable is used as the basis for separation in the decision tree model, and relative importance indicates the relative importance of the remaining variables when the importance of life satisfaction forming the first word is set at 1. Therefore, life satisfaction, over-skill, over-education, employment patterns, average monthly wage, average working hours per week, health status, and public sector employment are the factors that determine job satisfaction for youth paid workers.

To help understand the decision tree model, list the order in which the average job satisfaction is large around the end, as shown in Table 4. First of all, in the case of node 11, which has the highest job satisfaction among youth paid workers, the overall satisfaction level was high ($\geqq4$), regular workers (=1), and the job satisfaction level was highest with 3.75. In the case of node 16, the overall satisfaction level was high ($\geqq4$), regular workers (=1), the private sector (=0), and the job satisfaction level was 3.67 in the group with high monthly wages ($\leqq2.542$). In the case of node 15, the overall satisfaction level was high ($\geqq4$), regular workers (=1), the private sector (=0), and the job satisfaction level was 3.52 as a group with low monthly wages ($\leqq2.542$). The higher the average monthly wage, the higher the job satisfaction, even if the paid workers of young people with
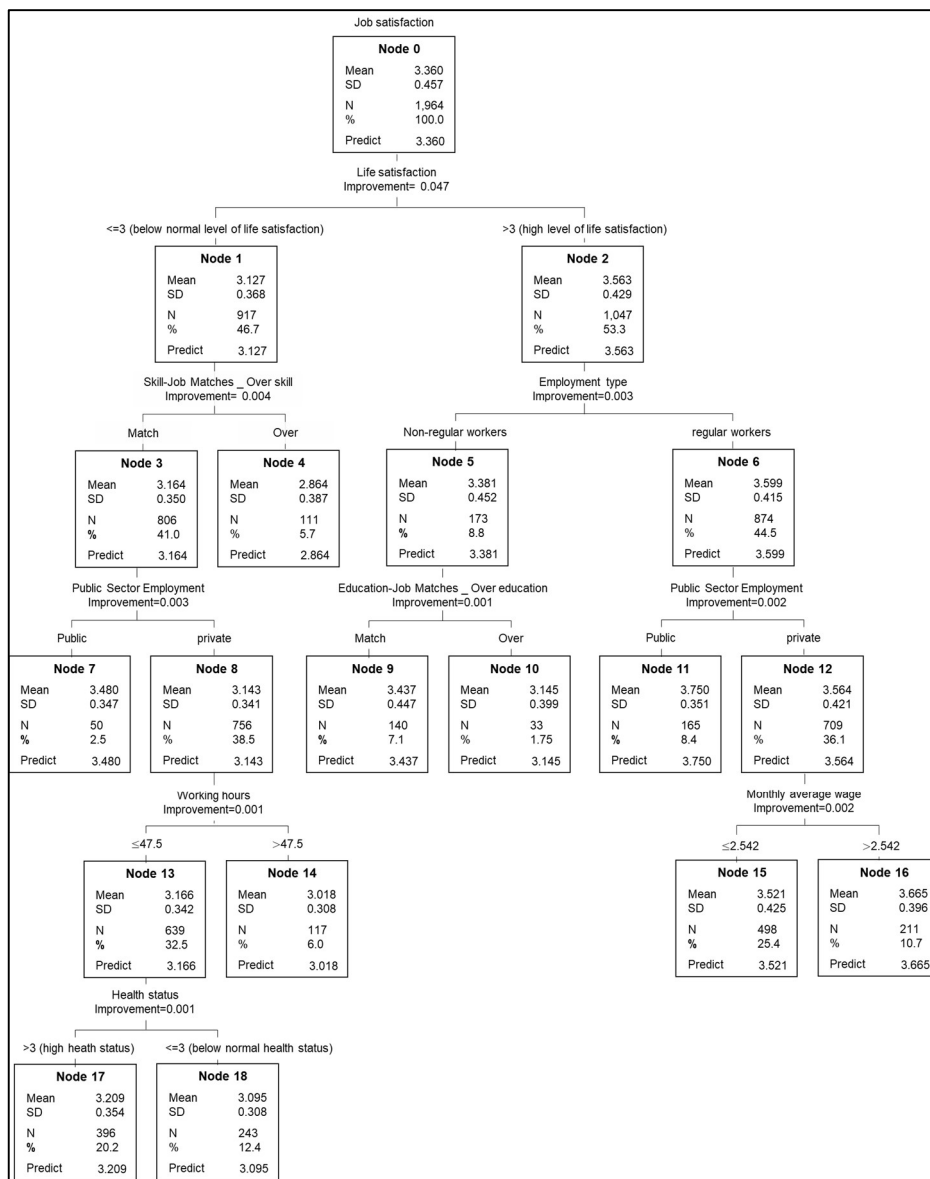
Figure 1. Decision tree model for determinants of job satisfaction for youth paid worker

full-time employment patterns are employed in the private sector. In addition, in the case of node 7, the overall satisfaction level was below average ($\leqq 3$), the job satisfaction level was 3.48 for groups with skill-job match (=0), and jobs with the public sector (=1). In the case of node 9, job satisfaction was 3.44 as a group with

Table 2: Risk chart of decision-making tree model

Risk chart sort	Estimation
Risk estimation (crossing)	0.143
Risk estimation standard error (Crossed)	0.006

Table 3: The relative importance of determinants of job satisfaction

Determinants of job satisfaction	Separation rule	Relative importance
Life satisfaction	1	1.000
Over skill	1	0.374
Over education	1	0.314
Employment type	1	0.298
Average monthly wage	1	0.248
Average working hours per week	1	0.152
Health status	1	0.151
Public sector employment	2	0.108

high life satisfaction ($\geqq 4$), non-regular workers (=0), and education-job match. In the case of node 17, life satisfaction was below average ($\leqq 3$), skill-job match (=0), private sector (=0), low average working hours per week ($\leqq 47.5$), and good health status ($\geqq 4$) groups showed job satisfaction of 3.21. In the case of node 10, job satisfaction was 3.14 as a group with high life satisfaction ($\geqq 4$), non-regular workers (=0), and over education (=1). In the case of node 18, job satisfaction was 3.02 for groups with moderate or lower life satisfaction ($\leqq 3$), skill-job match (=0), private sector (=0), low average working hours per week ($\leqq 47.5$), and low health status ($\leqq 3$). In the case of node 4, the overall satisfaction level of life was below average ($\leqq 3$), and the job satisfaction level was 2.86 compared to other groups as a group with over skill (=0). As such, it can be seen that job satisfaction among youth paid workers is the lowest when they perceive that their job satisfaction is low and their skill level is over.

Conclusion and discussion

Conclusion

First, the youth paid workers generally have more men than women, and their age is the highest in their late 30s. And the ratio of the academic background was higher in the order of college graduates, high school graduates, and vocational college graduates, understanding high school graduates, and college graduates, health status, and life satisfaction level are higher than normal. Regarding the type of employment, regular workers account for a higher proportion of non-regular workers, many work for private sector institutions, and most work in jobs without social insurance or labor unions. In addition, most of the non-regular workers in the youth chose non-regular workers as voluntary choices, with average monthly working hours of 2.6 million won and about 41

hours per week. Meanwhile, the level of skill/education-job is generally matched for paid workers. However, attention should be paid to interpretation because the self-reporting response was used, not through an objective evaluation of the level of the job performance of youth paid workers.

Second, the level of job satisfaction among paid workers in the youth is somewhat higher than normal level. The satisfaction level is high in the order of job satisfaction, job safety, work environment, working hours, communication and human relations, individual development potential, the fairness of personnel performance, welfare benefits system, wages or remuneration. This shows that youth paid workers are somewhat less likely to be treated than their inner satisfaction with their work, such as personnel audits, wages or remuneration, and welfare benefits.

Third, the predictors of determining job satisfaction for youth paid workers are life satisfaction, skill-job match, education-job match, type of employment, average monthly wage, average working hours per week, and health status. Among them, it is important to determine job satisfaction levels in the order of life satisfaction, skill-job match, education-job match, employment type, average monthly wage, average working hours per week, health status, and public sector employment. In particular, the group with the highest level of job satisfaction among youth paid workers is the case where life satisfaction is high, employment type is regular, and jobs are in the public sector. Even if jobs are relatively high and private sectors, job satisfaction levels can be seen to be higher if monthly wages are high, working hours are low, and health status are good. On the other hand, the lowest job satisfaction level is generally below normal and over skilling.

Table 4: Combination of determinants of job satisfaction using decision tree analysis

Node	Mean	N	Characteristics
11	3.75	165	The group with high life satisfaction (≧4), regular workers (=1), and public sector jobs (=1)
16	3.67	211	The group has a high level of life satisfaction (≧4), regular workers (=1), private sector (=0), and high monthly wages (>2.542).
15	3.52	498	The group has a high level of life satisfaction (≧4), regular workers (=1), the private sector (=0), and the average monthly wage is low (≦2.542).
7	3.48	50	The group whose life satisfaction is below average (≦3), skill-job match (=0), and whose jobs are in the public sector (=1)
9	3.44	140	The group with high life satisfaction (≧4), non-regular workers (=0), and education-job match (=0)
17	3.21	396	The satisfaction level of life is below average (≦3), skill-job match (=0), the private sector (=0), the average working hours per week (≦47.5), and the group with good health status (≧4) are low (4).
10	3.14	33	The group with high life satisfaction (≧4), non-regular workers (=0), and over education (=1)
18	3.10	243	The group of people whose life satisfaction is below average (≦3), skill-job match (=0), whose jobs are in the private sector (=0), whose average working hours per week are small (≦47.5), and whose health status is below average (≦3)
14	3.02	117	The group with a moderate level of satisfaction (≦3), skill-job match (=0), with jobs in the private sector (=0), and with high average working hours per week (>47.5)
4	2.86	111	The group with an life satisfaction level of below average (≦3), and over skilling (=1)
Total	3.36	1,964	

Discussion

First, based on the results of this study, it could be used to predict job satisfaction levels from information on the life satisfaction level of youth paid workers in Korea, skill-job match, education-job match, employment type, monthly wage, average working hours per week, and health status.

Second, the decision that the level of life satisfaction of wage workers among young people has the greatest influence on job satisfaction decisions. Given human nature, it is necessary to support work-life harmonization. Therefore, the job satisfaction level of youth people will be raised through various customized systems to enhance the balance between work and life, such as flexible work system, selective work system, and home-based work system for career-interrupted women, which has become an issue recently.

Third, considering that over-skill and over-education of youth paid workers are determinants that differentiate job satisfaction levels, it is necessary to come up with measures to enhance the suitability of workers' jobs, education levels, and skill levels. Jobs at lower levels than their education and skill levels reduce job

satisfaction, which can lead to frequent turnover and decreased productivity. Therefore, it is necessary to perform duties appropriate to one's skill level through job adjustment and relocation. In addition, it will be possible to improve the use of low human resources due to over education by expanding job information and improving job evaluation and compensation system for jobs in the labor market.

Fourth, Job satisfaction needs to be supported by considering that these variables work in combination with each other rather than whether one of the students' individual, working conditions or job characteristics factors affect each other independently. In particular, the study showed that youth paid workers with low job satisfaction had low life satisfaction and were over-skilled. It was also confirmed that the level of job satisfaction varies depending on the working conditions of the job. Therefore, in order to improve the job satisfaction level of paid workers among young people, it is necessary to strengthen institutional support for the performance of duties that conform to individual and job characteristics and the improvement of working conditions such as working hours and wages favored by workers.

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A Study of Picture Books into English Teaching Design and the enhancement of Children's Multiple Senses

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Abstract This research adopts a practical action research method to use picture book into English teaching instructional design to enhance the multi-sensory sense of young children. The main purposes of this research are: (1) To explore the multi-sensory sense of young children through picture book teaching. (II) Explore the teachers' strategies and implementation process of incorporating picture books into English teaching. (3) Improve teachers' professional knowledge and professional growth through action research. Participants in this study were 22 kindergartens and young children in a private kindergarten in Huwei Township, Yunlin County. During the one-month picture book teaching and research process, they used observational child learning, lesson plan design, and related literature and books to conduct Data analysis, as the basis for introspection and improvement of teaching.

Introduction

The "Interim Syllabus for Kindergarten Education and Protection Activities Curriculum (hereinafter referred to as the new syllabus)" (2012) promulgated by the Ministry of Education proposes that reading and expressing personal opinions are the goals of the language field, and teachers should make reading and responding a life habit. The brain stimulation of young children can start from various aspects of training such as sensory, environment, psychology, and child development tracking, such as the stimulation of vision development, teachers can prepare different colors or shapes of picture cards to stimulate young children's eyes; or For the stimulation of hearing development, teachers can use English teaching methods and musical rhythms to train the hearing of young children, or use various objects that can make different sounds to stimulate hearing; in addition, the stimulation of tactile development also develops from touching, grasping and tactile development. It can let young children get the effect of tactile stimulation, but also make young children get spiritual satisfaction. Therefore, I think that picture books are an indispensable teaching material for kindergarten teachers.

Picture books allow children to improve their language skills and have more understanding of words in a subtle way. Picture books are not only suitable for children to read, but also can effectively help children learn to listen, read, write, and therefore many preschool teachers often use picture books for teaching (Deng Yunlin, 2011; Chen Shumin, 2005). Teachers can use the single-character flashcards in the picture book and different sentence patterns in teaching design, but also through vision (flash cards or multimedia projection equipment), hearing (song and oral expression), somatosensory (body movements), not only can increase The interestingness of the curriculum can also achieve higher learning effectiveness and learning motivation for young children.

In the preschool stage of early childhood, it is necessary to provide more sensory perception stimulation and experience teaching to help children develop and learn.

However, any development preparation period is guided by sensory perception to guide children to use different sensory perception systems from my exploration → try→ learn new things so that the development can be established in order. In fact, from the perspective of multi-level sensory teaching, the development of sensory perception is intertwined, complementary and influencing whenever and wherever: stimulus → reception→ learning.

Therefore, this research adopts the action research method, and through the teaching of picture books, children can perform visual, tactile, auditory, proprioceptive... and other multi-sensory stimulations in learning activities. The purpose of this research is:

(1) Explore how to inspire children's multiple senses through picture book teaching.

(2) Discuss the teacher's strategy and implementation process of integrating picture books into English teaching.

(3) Enhance teachers' professional knowledge and

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professional growth through action research, and share the knowledge gained in action research.

Literature

1. The importance of picture book teaching

It is also a picture book, but has different teaching methods and teaching designs. For example, teachers can help young children cultivate the development of the language field. The picture book is an object that enhances children's multiple senses. Because picture books are childlike, educational, artistic, Interesting and communicative (Zhu Bilian, Chen Yuting, 2016), the content read by children and the multi-sensory behavior information conveyed when reading picture books, as well as the multi-sensory established by the communication between teachers and peers, achieve good results. The teaching of picture books is the accumulation of a series of teaching activities. Domestic linguists also support the concept of cross-language implementation (Ke & Lin, 2017), so children's language development is a process of systematically constructing knowledge. Teachers can encourage children to read meaningfully the important messages conveyed by picture books (Gu Ruimian, Wang Yijing, 2012; Xie Yinghui, Chen Yanhui, 2014), to allow young children to develop multilingual and multi-sensory abilities through picture book teaching, and the teacher will do extended picture book teaching activities. In addition to helping children deepen their impression of picture books, it also allows Toddlers link life and learning experiences.

Teachers can make good use of picture books with rich and diverse themes, and combine multiple sensory courses to form a cross-domain integrated learning. They can use picture books as a medium to carry out multi-sensory extension activities to increase the teaching content of picture books and make them more interesting. Learning can deepen breadth and depth. Teachers also need to lead children to share texts in picture books and cultivate children's multi-sensory expression skills. Researchers based on the importance of children's literacy germination, collate the literature and comprehensively apply multiple picture book teaching strategies, and refer to the Ministry of Education (2012) The new syllabus of Chinese language learning indicators design teaching activities, combined with action and research, improve the inappropriate teaching methods at the teaching site, allowing young children to use multiple senses in reading and game courses to improve their listening, speaking, reading and writing skills.

It can be seen from the above that, when planning curriculum activities, teachers should not only consider the learning needs and interests of young children, but also start from the three aspects of the meaning and value of picture books and extended teaching activities to produce meaningful integrated learning. The purpose of this research is to explore the change of motivation for children's English picture book learning by distinguishing the multi-sensory teaching method.

2. The application of picture book teaching integrated into teaching design

(1) The characteristics and value of picture book teaching

Picture book teaching can increase students' interest in learning and guide English learning with image-based concepts. Therefore, it is necessary to discuss the teaching of picture books for young children and sort out the meaning, characteristics and value of picture books (Wang Rengui, 2011). Picture books put great emphasis on the visual learning effects of readers, so the exquisite arrangement of images and text is presented in the book layout, which contains many visual meanings. Depending on the characters, colors, details and beauty in the pictures, children can feel the emotions and meanings revealed in the pictures, so that children can experience and guess with intuition or imagination, and expand children's life areas. Picture books are the best communication bridge between young children and teachers' teaching tools to attract children to participate.

Picture books combined with interesting story lines can attract the attention of young children. If they can be combined with English language concepts, picture books The plot of the story enhances the children's multiple senses, enabling students to strengthen the five senses, association, imagination, expression and understanding in reading picture books. According to the literature discussion, it is pointed out that children's awareness of using picture books to integrate multiple senses is an important ability in the development of children's language. Therefore, the use of multiple sensory cognitions in the teaching design of picture books is an effective help for children in learning.

(2) The significance of multi-sensory teaching

In the context of life, the brain will be more often exposed to multi-sensory stimulation, and if the brain is in an environment where information appears through multi-sensory patterns, it will have complementary effects, so learning performance will be more effective. (Katai & Toth 2010) Jenreem Bruno, a psycho-pedagogist at New York University in the United States, discovered through research that human learning activities are mainly carried out through sight and hearing in the

process of practice. Children learn language through listening, speaking, reading, and writing from time to time in their daily lives. Language learning is comprehensive, and the combination of language and life experience has meaning (Fang Shuzhen 2010). A variety of sensory cues are added to the English teaching content, and sensory memories such as images, sounds, touch and actions are integrated, which is beneficial for learners to open listening, doing, and seeing sensory organs in the process of learning English, allowing learners to learn Experience reinforces each other due to these different sensory stimuli. Multi-sensory teaching is a teaching method that effectively promotes children's English learning motivation and interest. The goal of cultivating children's multi-sensory cognitive abilities is the teaching design and provides new research directions.

3. Application of picture book instructional design in multiple senses

When teaching picture books, make good use of the interesting patterns or text plots of picture books to continue children's learning interests and expectations; or when teaching, important English language can be conveyed in the pictures or text content of picture books so that children can Master the key points and logic of English learning, and arouse interest in English learning (Wang Rengui, 2011). Multimedia can be used to stimulate the visual and auditory senses of the body to strengthen the learning of picture books, which is sure to be better than traditional learning. At the same time, when teaching multimedia picture books, you can experience the situation of picture books through role playing, so that students can actually experience the picture books. The interactive communication of the characters enhances the emotional and appropriateness of language expression.

Materials and Methods

1. Research design

The reason for the action research of this research is: in order to improve the English learning motivation and language use of young children in the actual teaching site, the concept of enhancing the multi-sensory inspiration by teachers using English picture books into English teaching design is proposed, according to the garden Design appropriate activities and content based on the characteristics and teaching thematic units. First, guide students to experience the general direction of picture book reading, then let students listen to the story sentence pattern and express, and then subdivide the words of the small target, introduce the pronunciation

letters and the words in the picture book one by one. Relevant words, and finally back to the text of the picture book, can achieve the integration of English picture books into English teaching design to enhance multiple senses, so action research is taken as a way to combine theory and practice.

This research originated from the researcher's belief that young children can use story-telling activities to cultivate listening and understanding, and stimulate their own interest in storytelling, speaking, and writing. It is really important to have a complete and meaningful language learning experience, so the plan is to use "English "Picture Books" is the core. Based on the teaching themes of the 107th school year 1st semester, English picture books are selected that are consistent with the concept of the theme, the picture book teaching activities are designed, and they are actually implemented in a CUHK class in a bilingual kindergarten. Take an action research method to explore the teacher's course of teaching English picture books.

Researchers develop, design and implement English picture book teaching activities, and use methods such as observation, video recording, audio recording, interviews, work collection, and reflection for systematic funding. Collection and analysis. In the process, through the introspection of the teachers, the observation of the feedback and reactions of the young children, the examination of the suggestions of the instructor, research friends, and consultants, the revision of teaching strategies, and the discussion of the problems and difficulties faced in the teaching process of English picture books, and put forward The solution strategy, and at the same time record the change of thought or attitude of the researcher during the research. Further expand the application of English picture book teaching in the curriculum design of bilingual kindergartens, and implement the test of English picture book teaching as an American teacher.

2. Research object and research field

This research focuses on the researcher's own teaching in a bilingual kindergarten. The subjects are 12 boys and 10 girls, 22 people in total. The researcher serves a kindergarten attached to a primary school in the outskirts of Yunlin County. The rural natural landscape of the area is simple. And it has calm characteristics. Its kindergarten curriculum design combines bilingualism, life, culture, food and agriculture education as the planning focus, diversified and internationally compatible with the local teaching activity design. The school has a very good atmosphere for teachers to learn, and the school director encourages teachers. Professional advancement, the cooperation of resources required by the

researchers in the school or the collaboration of teachers in the same class are all supported, which is of considerable help to the research.

3. Research process and strategy

This research is conducted in an action research design method, and is mainly presented in current action research practices with practical action research. Practical action research has three assumptions. First, individual teachers or teacher teams are autonomous and can determine the nature of the implementation of the research; second, teacher researchers should continue to develop in the professional field and reflect on teaching systematically Practice; third, teacher researchers can choose their own professional fields, decide their data collection, analysis and interpretation of their data, and design action teaching processes based on the findings of teacher researchers. Based on this, the main research process of this study is further explained as follows:

(1) Discover and define topics

This stage is mainly for teachers to discuss and share the problems faced by the thematic teaching activities at this stage. Therefore, based on the research motivation and purpose, through communication with parents and discussion and analysis of the school teacher group, a consensus is reached and the research is determined The theme is: Action research on the integration of picture books into English teaching design and the enhancement of children's multiple senses.

(2) Develop strategies for action research plans

After setting the target, the teacher researcher began to collect and read relevant literature and special books, and set the following four teaching themes (1) animals (2) family members (3) fruits (4) toys. Carry out the curriculum planning of its series in the spirit of the new syllabus, and decided to adopt "Picture Book Integrating English Teaching Design to Enhance Children's Multiple Senses". In addition, implement diversified assessment and activity design to inspire children's multiple senses. Understand children's motivation and development of picture books.

(3) Implementation of the action plan strategy

The study started in March 108 to implement the first phase of the action plan and implement teaching activities. This research period has gone through 4 stages to integrate picture books into English teaching (shown in Figure 3-1), and picture books use multiple senses to integrate the thematic English teaching.

4. Research tools

In order to understand more about children's acceptance of picture books using English instructional

design to inspire children's multiple senses, perceptual abilities, and environmental information, and to understand the messages and the messages between them, the assessment tool used in this study uses multimedia projection equipment and digital cameras to record children's daily curriculum performance, work archives, young children's works or other related archives, are recorded by taking photos, and then presented in written reports as evidence for data collection and observation. It is also recorded by recording. The position of the recorder is given priority to interference with children's learning. The best position is near the teacher's storytelling to avoid children's distraction and play, and to clearly record the children's voice before proceeding. A text manuscript is used to explain the interaction between the researcher and the young child, and to use as a revised teaching strategy.

Results

The main purpose of this research is to use the course of action research and the teaching of "the integration of picture books into English instructional design to enhance children's multiple senses", to enhance children's multiple sensory inspiration, learning motivation and development, and to improve children's multiple senses. Innovative teaching design target items and teaching materials to understand the vocabulary that young children obtain expression and acceptance, and it is more helpful to obtain expressive vocabulary in the guidance of multiple use of picture books. These findings indicate that, under certain conditions, the instructional design used by teachers has different effects on the acceptance and expression of vocabulary by preschool children. Therefore, teachers' reflective teaching is very important.

1. Curriculum design of subject teaching

The action research in this study is based on the self-reflection of field teachers, mutual discussions between the school and the kindergarten, and feedback from children and parents. The scale project includes all the items that children need to evaluate in a theme course. It is based on the picture book. The activity goals of the theme are compiled together. Table 1 illustrates the evaluation items of three activities in the theme of "My Family", but not all activities are included. In terms of quantitative results: the performance of each evaluation item can be divided into "good performance" means that young children can independently perform the project; "needs assistance" means that children can achieve the

Time	Topic	Multi-sensory sense		
Date	108.03.07	108.03.14	108.03.21	108.03.28
Table 1	Loving Family	Loving Family	Loving Family	Loving Family
	animal	animal	Family	Family
		(The sense of vision)		
Table 2	animal	animal	Family	Family
		(hearing & body movements)		
Table 3	animal	animal	Family	Family
		(The sense of vision & oral expression)		
Table 4	workbook	workbook	workseet	Archive

Figure 3-1 The thematic of picture book into English teaching instructional design to enhance the multi-sensory sense of young children

project with the assistance of adults or peers; "Still to be developed" means that the child has not been able to achieve the project even with the assistance of an adult or a companion. Teachers use a variety of methods, based on their usual understanding of children's actual performance from multiple sources of information, and carefully select them.

In terms of qualitative results: Teachers can describe the children's multiple sensory performances in the entire theme in abstract text. First, describe the parts where students perform better, then describe the parts where they perform weaker, and finally put forward specific ways that parents can improve their children's disadvantaged areas at home. Therefore, not only do parents have a clearer understanding of their children's performance in the use of multiple senses in this topic, but they can also enhance their children's learning motivation through activities. During the process, they will discuss how to address the deficiencies and deficiencies in the previous stage and in the next stage Appropriate amendments should be made in design and teaching.

2. Children's picture books enhance the results of multi-sensory evaluation

From the research results, it can be found that teacher researchers use interactive games to design teaching with young children, emphasizing the process of interaction and discussion between teachers and young children. Starting from the cover and opening the picture book, the teacher researcher connects the contents of the book with the children's life experience. Through questions and responses to help children understand the content of the picture book, according to the multi-sensory assessment items, according to the analysis of the four-week teaching course, observe the progress and growth of the children's multi-sensory performance, the number of performances has increased (See Table 3-2), there is a trend of gradual progress. It can be seen that young children have a significant effect under the teaching design of multiple senses.

The picture book teaching extension activities have a variety of methods. In addition to helping children

deepen their impression of picture books, they also allow them to connect with their life and learning experiences. Teachers can make good use of rich and diverse subject picture books and combine courses to form a cross-disciplinary integrated study. As Gu Ruimian (2010) said, the curriculum is integrated with literature. Teachers can carry out extended activities in various fields based on the content of the picture book to increase the breadth and depth of learning. The extended activities of the teacher researchers during the research period include language games, song performance activities, and creation of picture books. The activities are mainly based on the language field, which can not only develop cross-field art and music fields. From cross-domain activities, researchers have seen children develop deeper multi-sensory comprehension by combining body movements, painting, and emotions. Children's language learning should integrate all fields in order to bring children a more complete experience.

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Possibility of Vocational Learning in Social Studies in Elementary School: Based on a Class Analysis of Local Industry in 3rd Grade

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Abstract <Background> The purpose of this study is to clarify the vocational learning embedded in children's lives from the viewpoint of Lesson Study. In particular, it is pointed out that the education on workers in Japan is not sufficient. On the other hand, the use of ICT in classes and the programming education introduced in 2020 are considered to have vocational significance. This is because ICT use and programming education are extremely superficial and formal, and it is easy for anyone to imagine the relationship between educational activities and vocational learning. However, in elementary school, vocational learning is deeply buried through classes in life studies and social studies. In this study, it is stated that the richness of life experience has the potential for vocational learning through social studies classes in elementary schools.

<Subject & Analysis Method> This study uses lesson records (transcript) published by private educational organizations. In particular, the author used the records of the class "Thinking about the president's commitment through making miso" conducted in the social studies for third grade elementary school students. In the previous class used in this study, students discussed whether the president was tired of making miso or not. When the teacher told him what was going on, he said, "I'm actually worried." So, the teacher decided to discuss what the president was worried about. In this research, first of all, the words of interest in the transcript are selected. In the case of this class, think about "worries" and "feelings." Therefore, the number of appearances of those words is high. It is necessary to pay attention to "change the taste" and "the taste is different", and also to pay attention to "no", which is the value that students think. Next, the transcript is divided into several segments based on the position of appearance of the word of interest. The reason for this is to grasp the content of the discussion or find a characteristic statement by using the transition of the topic as a clue. Finally, the author will look at this lesson as vocational learning, not social studies, and discuss its significance and potential as vocational education.

<Discussion> From this study, students argue that what the president is worried about is the change in the taste of miso made by his successor. From this, it became clear that the students were thinking from a very consumer perspective. Among them, Student M consistently speaks from the producer's point of view, and disagrees with other students until the end of the class when that point of view is accepted by other students. For example, the president has stated that he would accept or be prepared to change the taste, and that he should make miso with a different taste when he gets tired of the same taste. From the above, it is understandable that vocational learning is provided in Japan even if it is not explicit. In addition, it is thought that the students will have a rich life experience to broaden their view angle and enrich their sense of values.

Keywords vocational learning, social studies, elementary school, a rich life experience, the producer perspective

1. Introduction

Even focusing on "labor," the youth of each era have been portrayed in an extremely negative light, especially by sociologists and the media. For example, in the 1960s in Japan, there were the "Hootenangs" and the "hippies" who did not have a regular job and lived their lives as they wished, and in the 1970s, there was the "gentile" who had cut off contact with management in the corporate world. There are two types of people: "newcomers," representing normative young people, and "moratorium people," representing young adults who are in the process of spiritual self-formation and have not been able to assimilate into society; in the 1990s, "self-discovery," representing young people who are in constant search of their own way of life and place in society; in the 2000s, the young people who are not in school or work and have not received vocational training. There are "NEETs" who are young unemployed people who have not been accepted. The gradual change over time, from a concept that relates to society to one that focuses solely on the individual, is considered to represent the fragmentation of young people from society.

The pedagogically interesting point is that when we talk about them, the education or curriculum they have received is spoken at the same time (Heller, Celia S.,

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1966; Harland, 2001; Gordon, et al., 2005; Morimoto, Friedland, 2013). The young people in the 1990s mentioned above were educated under " realizing a comfortable and fulfilling school life = optimizing the learning burden." And the young people in the 2000s were educated under " cultivating rich human beings who can respond to changes in society by themselves. " Until the 1977 edition of the Course of Study, students had a lot to learn and received knowledge-oriented cramming education. From a different point of view, it was a passive lesson in which the teacher taught one-sidedly and the learner just remembered what was taught. From the 1977 version of the Course of Study, the content of learning was reduced, which slowed down the pace of teaching and gave teachers more time to create teaching materials and do various tasks. In addition, the students were given room to have a rich life experience outside of class and school. As a result, the number of lessons in which teachers and children or children interact with each other has increased, and the lessons are changing from passive lessons to independent lessons. At the same time, this meant that the students, who had been detained due to the amount of learning content, were released both physically and mentally, and it was no longer possible to proceed on the laid rails. Therefore, it is thought that he began to search for his own way of life and whereabouts, and even to avoid going out into society. From the perspective of lifelong education, Sasaki (2007) described NEET as "an entity that guarantees the possibility of receiving education and vocational training, but chooses not to exercise them." In addition, "Modern Japan has reached a 'society with space' in a quantitative sense, but it does not go beyond a 'society without space' in a qualitative sense. In other words, various values and a wide variety. Even though we have reached a society in which human beings exist, they have not become a vessel to tolerate and utilize them, "he points out as a social problem.

Assuming that young people are "self-selecting subjects," we need to think about how vocational and labor views are formed through vocational and career education in high schools and universities. Terada et al. (2012) conducted a questionnaire survey on career hopes after graduation, the existence of desired occupations, the existence and specific contents of events related to occupation selection, the existence of career models that influence the formation of occupational views, and the existence of occupational dialogue at home. He then compared and analyzed high school students from the United States, Germany, Indonesia, South Korea, China, and Japan. As a result, the following became clear. 1) Being a vocational / technical student but having an undecided career path or not having a desired profession 2) Between ordinary students and vocational / technical students , There is no significant difference in items aimed at leaders and wealthy people, 3) 40% of the students who answered that they have a negative model and those who answered that they have neither a positive model nor a negative model 4) Japanese and German high school students have a weak view of profession, 5) Japanese and Indonesian vocational and technical students have a high degree of social service and economic stability, and 6) Japanese ordinary students The need for service-oriented and economic-oriented vocational education and career education, 7) Review of learning in ordinary subjects and vocational education up to the 10th grade (first grade of high school), and experience such as helping at home. As far as the survey results of Terada et al. Are reviewed, there is no big difference in the formation of occupational values due to differences in countries and high school specialties. Furthermore, considering Sasaki's claim, if we limit ourselves to Japan, it is considered necessary to provide not only institutional and formal vocational education that has been schooled and vocational education that learns only the abilities necessary for vocation, but also vocational education that contributes to human development in relation to life experience.

Based on the above, this paper clarifies the possibility of vocational education in general education for elementary school social studies classes. However, as Terada (2009) wrote, in a broad sense, vocational education means "basic vocational education by certain industrial sectors and specialized science in schools and post-secondary education" and "education to develop the abilities necessary for the profession." Also, in a narrow sense, vocational education means "more practical and qualification-requiring vocational education." Therefore, although elementary schools are excluded from the target, the author thinks that it is appropriate to include classes at elementary schools where students will learn occupational and labor views in a hidden curriculum. When it is not the mainstream era to work immediately after graduating from junior high school or high school with a job in hand, but the mainstream era to work after receiving higher education, we consider that the period of attaching and demonstrating the vocational and labor values was shifted from the mid-teens to the mid-twenties. However, considering that there is a critical period in vocational education and career education as in language education, we can position elementary school students to the Growth period which is the stage of development by Super (1957; 1990), who forms a self-concept and pursues interesting quests through abundant daily

life. What we consider about what kind of vocational learning and learning on workers should be given during the growth period of elementary school students, or what kind of vocation-interesting and labor-interesting classes should be taken in the field of vocational learning is an issue.

2. Vocational learning / learning on workers at elementary school

Occupations are often chosen after upper secondary education, but Ginzberg (1951), Super (1957), and Gottfredson (1981), who studied vocational developmental theory, also chose professions during elementary school. It is assumed that there is a developmental stage. Based on this, the choices and hopes of elementary school students have been investigated.

Takeye (1969) revealed when men and women in childhood choose a profession, interest (fantastic / admiration, realistic interest) and value (self-actualization, economy, interpersonal / social, social service / duty) are factors in the choice.

Miyata (2012) surveyed elementary school students about their desired occupations and clarified the differences in their desired occupations due to differences in gender and developmental stages. Specifically, in the case of boys, there is a strong hope for professional athletes in the lower and middle grades, but in the upper grades, that hope weakens, and they answered "there is no job to do." In the case of girls, in the lower and middle grades, they hope to be flower shops, bookstores, reporters, hotelmen, etc. and in the middle grades, they also want to be bread and cake makers, architects, nursery teachers, teachers, nurses, etc. Moreover, in the upper grades, it has been revealed that they desire art-related professions such as cartoonists, designers, and singers. It is also clarified that the proportion of "self-actualization" decreases in the upper grades of both men and women, and the proportion of "useful" increases, which was less in the lower grades.

As mentioned above, vocational education is provided in Japan after upper secondary education (high school), and the compulsory education period of elementary school and junior high school is not included. Career education from primary education is significant for vocational education and labor education after upper secondary education, as Terada (2014) wrote about career education, "career education (development) that is (should) be conducted from the elementary school stage or early childhood education stage completes the first stage by leading to the transition to employment and the formation of professional vocational ability (training)

for that purpose." Terada (2014) positioned career education in Japan as a comprehensive educational activity for career development, which does not completely match career guidance, vocational education, or vocational outlook education, and then career education in elementary schools. 1) Systematic guidance and counseling throughout the grade / school stage, 2) Subjects / subjects / areas to prepare directly for work and profession, 3) Enlightenment experience at work and vocational sites, 4) Learning of teaching materials related to work and profession in regular subjects and the Period of Integrated Study, 5) Professional education and vocational education (specialized career education) as a summary stage of general career education, 6) Children / students / students It is said that it consists of associations with activities in the private life area and human relations (family life, extracurricular activities, etc.).

Of these, the focus of this study is the association between 4 and 6. Through regular subjects' lessons that are not specialized education or vocational training, teachers let students face the "problems" embedded in the child's daily life and let students be conscious of the labor, especially work, that is deeply involved in the child's life. The author thinks that this will enable students to learn the way of life and the meaning of life, which in turn will lead to the formation of a vocational outlook.

3. Significance of social studies as vocational learning in elementary school

As mentioned above, there are no subjects that educate about labor or work in elementary schools directly. However, this does not mean that lessons don't deal with labor or work. For example, in the third grade, through collecting information by tours, observations, interviews, etc., students learn by relating it to people's lives at not only classroom but also outside of school about the work of related organizations; such as fire departments and police stations in the "region", the production and sales work seen in the region, and the state of industry and consumer life in the region. In particular, the students learn about 1) the relationship between production work and the lives of local people, 2) ingenuity found in sales work, 3) the work of institutions that protect people's safety and the people engaged in them, 4) ingenuity for sales with wishes by consumers, and 5) Learn about the types and processes of work. In the 4th grade, students learn about "prefecture" industries, community development, and businesses that supply living infrastructure in relation to geography (land shape). Furthermore, in the

fifth grade, as involving in society to tackle and solve problems in society, students will learn about agriculture and fisheries in the "nation", food production, industrial production, the ingenuity and efforts of the people engaged in them, the significance of food and industrial products, and the relationship between social informatization and industry.

Other than social studies, in the Period of Integrated Study, students survey local industries, interview workers in industries in prefectures as part of career education. They interview with workers outside the prefecture in connection with the activities, also as extracurricular; excursions and school trips. However, these subjects are not set labor education as their primary learning goal and therefore rely on the discretion of the principal and teachers. In addition, although classes similar to craft education are conducted through Home Economics and Arts and Crafts classes, they are positioned no more than as the foundation of technical education and vocational training. Looking at the contents of the course of study, the "work" that appears is 106 places for social studies, 75 places for home economics, 3 places for arts and crafts, "occupation" is 4 places for social studies, 3 places for home economics, 2 places for arts and crafts, "Industry" is 256 places for social studies, 1 place for home economics, 0 places for arts and crafts, "Labor" is 8 places for social studies, 2 places for home economics

and arts and crafts, "Career" is 1 place for social studies and arts and crafts, 2 places for home economics. Social studies let elementary school students make aware of their profession and industry, and survey and think about the field and the people who work there, so it is a valuable opportunity for them.

4. Lesson analysis

4-1. Analysis subject

Based on the above, in this study, the author analyzes a lesson for social studies in the third grade of elementary school. The research subject of this study is a lesson which students learn about local industry, investigating a soy sauce and miso shop that has been manufacturing and selling since 1914 in the town where children live, and interviewing with the owner M.

In that area, until the founding of Miso-ya, miso was made by ordinary households and did not exist as an industry. However, making miso is not easy, so residents had a desire to eat miso deliciously and comfortably. In response to that request, the owner M's ancestors started a miso shop. In recent years, miso has been produced in large factories more than 100 times as much as M's shop, and they are now sold in supermarkets. In other words, students face various values for labors and industries,
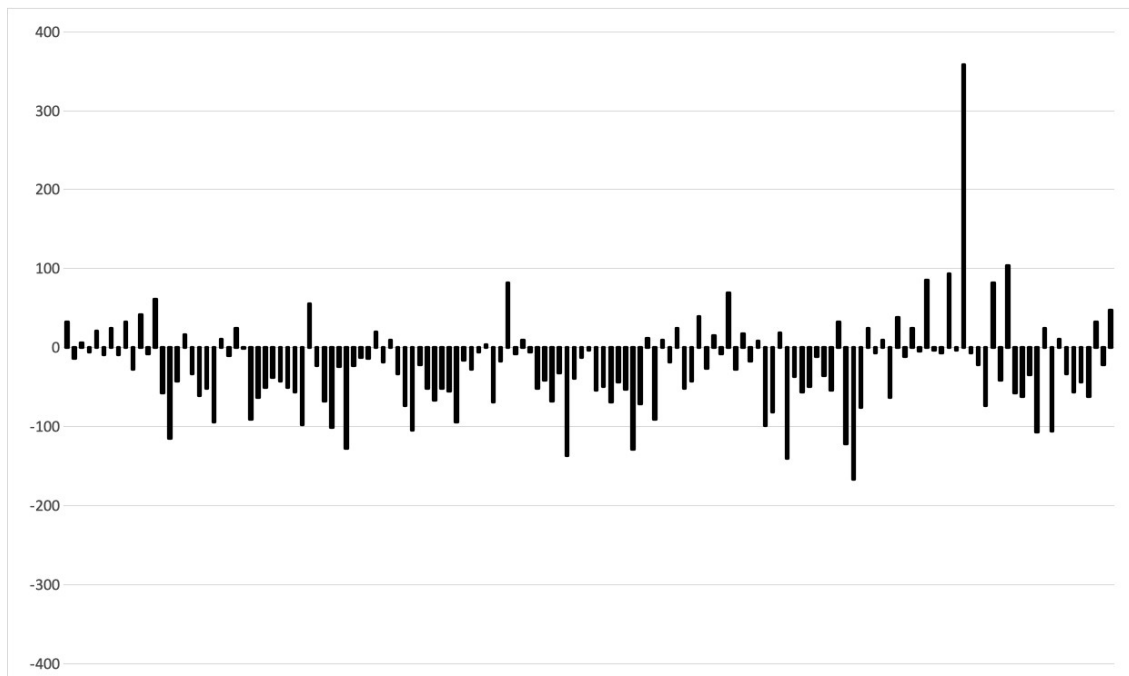
figure 1: Status of remarks in the lesson
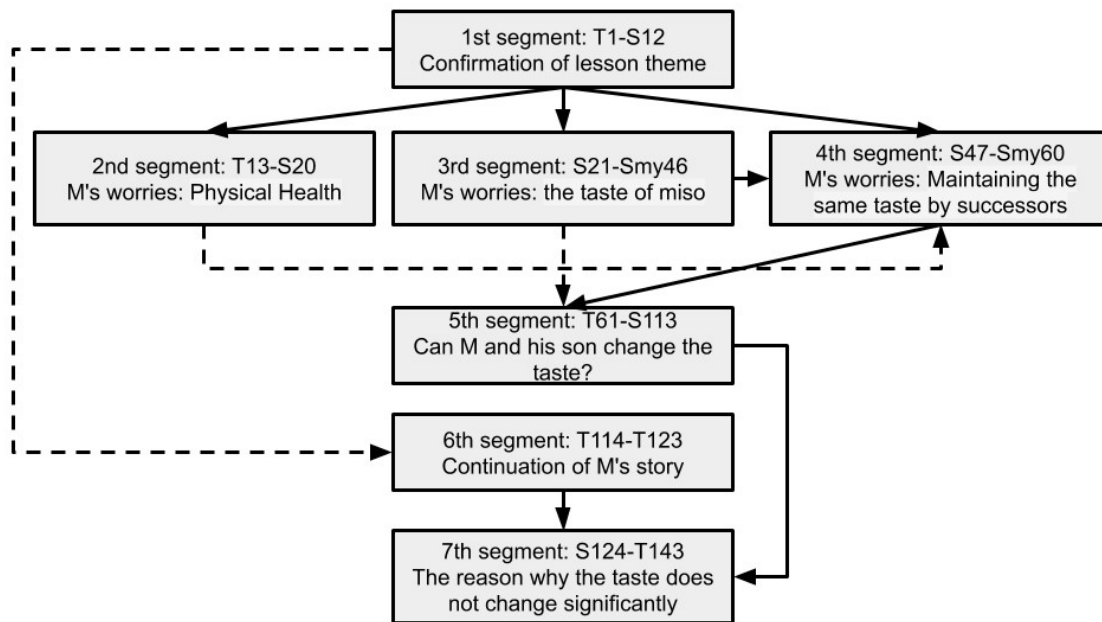
figure 2: Segmentations and the structure

such as comparing small-lot production with mass production, the differences in taste and popularized taste since the establishment, the significances manufacturing that sticks to tools and technology, and the significances manufacturing using machines.

When the teacher had a meeting with the owner M, the teacher told M that "the children talked about whether they got tired of making miso or not." In this study, the author analyzes a lesson in which children discuss the meaning of what M said, "It's a childish idea. In fact, I'm worried."

4-2. Analysis method

In this study, the author used the method of lesson analysis (Shigematsu 1951).

1) Carefully read the lesson record
2) Divide the lesson record into segments

In the case of the lesson records used in this study, there are a total of 143 remarks in 45 minutes. As shown in Figure 1, it can be said that the lessons have more children's remarks and more remarks than general classes in Japan. The segmentation can be divided according to the content and form of the lesson, and in this study, it was divided into seven segments as shown in Figure 2.

3) Decide which student(s) to focus on and follow the changes in their utterances

In this study, the student Smy (hereinafter referred to as Smy) was positioned as an extracted child, and changes in his remarks were followed. According to his teachers, he is a class leader and a student who is willing to work in classes to investigate the town in which he lives. He also visited a soba shop when he had previously explored the town. His teacher said he wasn't convinced why cold soba was selling and was thinking alone. In addition to the teacher's opinion, although he makes statements in the class to be analyzed, the number of words is small, and at first glance it seems that he is just saying it. However, since Smy own thoughts seem to be in the background, the author thinks that if he clarifies it, we can clarify how children perceive society, specifically local industry, so he decided to pay attention.

4-3. Results of analysis: Understanding the position by changing the viewpoint

The class began with a teacher asking, "What is M worried about?" (T1). Smy raised his hand second and said, "I think what M is worried about is the work of preparation and aging, because that work involves about 30 50-ton tubs. I think M is old and has no body, so I imagine M is worried" (Smy15). Other students said about M's worries, "M is worried that M's son will get tired of making miso and will stop the shop" (S14), "M is worried that he will continue to use the miso factory" (S18), "I think it's bad to ask M's son because of M's

physical strength" (S20), "M is worried that the number of customers will decrease" (S21). These can be organized into M's physical strength, store continuity, M's reliance on his son, and the number of customers. Meanwhile, the student Sok said, "When I saw how to make miso, I thought it was serious and amazing. At that time, I imagined that M thought that he should not make a mistake in making miso" (S37). And the student Skm said, "M is an elderly person, so if he dies, he will make his family sad, and M's son will make miso alone. That will make his current customers sad" (S39). In response, Smy said, "It doesn't matter if M disappears" (Smy42), and "even if M dies, M's son should make more and more" (Smy46).

After that, the topic changed to whether M could produce the same taste. Smy said, "Even if M doesn't taste the same, I think it's okay to have a different taste" (Smy53). On the other hand, most of the students objected to changing the taste because "it was made for many years" (S65, S66, S67, S75, S78, S79), "because people who like M miso will be disliked" (S68, S70, S74), and "because customers will be sad" (S69, S85, S86, S92, S94). After those opinions came out, Smy said, "I think it's okay to change the taste. Customers will get tired of eating the same taste all the time. M should sometimes try making miso with a different taste" (S96).

From the above, while Smy is worried about M's physical strength, Smy has the idea that M does not have to be obsessed with making miso and that M's successor can make miso. Therefore, Smy has the opinion that it is inevitable that the taste of miso will change. Rather, Smy believes that different tastes benefit customers. The author cannot say that Smy at this stage has a sense of ownership as a producer. At first glance, it looks like a consumer, as Smy says, "Customers get tired of the taste." However, I do not think about the feelings of the customers based on tradition as shown in the remarks of other children and the sadness of the customers due to change.

The teacher read M's remarks following "I'm worried." The content was "Miso is alive. I have made miso dozens of times, but I can never make the exact same miso" (T118). When Smy heard it, he said, "you see" (Smy119). The teacher went on to say, "There are cold and hot years, and the temperature and weather change, so I always have to think about miso. I have to think about miso and I'm worried" (T121). The teacher conveyed M's remarks to the students. Smy then convinced him, "Oh" (Smy122), he said, "I don't think M is tired of making miso, because M makes and sells miso that he finds delicious" (Smy126). At the time of "you see," Smy only emphasized that his claim of "not the same

taste" was appropriate. However, Smy's "Oh" includes a deep understanding of miso making and an understanding of the producer's position, such as "that's what it is" and "that kind of perspective." In other words, the author thinks that Smy's remarks, "I never get tired of making miso" and "M makes and sells what I think is delicious," statements that have shifted from a third-party perspective to the producer's perspective.

5. Discussion: Understanding the position by changing the viewpoint

Labor is an indispensable part of life for children. Workers, including teachers and parents, are commonplace around them. Labor for them is not special, it is embedded in everyday life. In other words, labor is considered to be more and more obscure because it is too familiar and commonplace for them. It is not easy for us to dig up "labor" from such a state and convey it to children. Moreover, it is not easy for us to teach children what kind of profession they have and to convey their significance. In that respect, as mentioned above, the author thinks that social studies have the role of vocational learning in school education, especially the role of fostering a view of vocation for elementary school students. Children study "municipalities" in the third grade of elementary school, "prefectures" in the fourth grade, and "country" in the fifth grade. The author thinks that the lessons for learning about local industries in the third grade of elementary school, which is the start of vocational learning, play an important role as a foundation for cultivating children's views on vocation and labor.

Because these things are written in the course of study, teachers ignore materials related to the area that is actually related to the daily life of children, such as "There is such a shop here" or "There Such a person is working. " However, if one-sidedly teaches the contents of social studies or simply says what the child should learn without letting the child think about it, the child will be deprived of the opportunity to learn the view of occupation and work. From the standpoint of problem-based learning, which is one of the attitudes of working on social studies, human beings who have the ability to create a new society will not grow. To prevent this from happening, children must have a rich life experience, and teachers need to give lessons that bring out such rich life experiences. Hibi (1995) describes the following six stages as problem-solving learning stages. 1) Children face problems, 2) Clarify the problem, 3) Make a plan for problem-solving procedures, 4) Gather the knowledge that will be the material necessary to solve the problem based on the plan, 5) Exchanging knowledge, using the collected knowledge as a basis,

forecasting problem solving and making hypotheses, and 6) Examining this hypothesis and reaching a definitive solution. The premise is that the teachers make the students do activities based on the desire to "want to" and "let's do" and activities to solve the problems of "why" and "for what", and make students think them.

In Smy's remarks focused on in this study, "Even if M dies, M's son should make more and more" and "I think that it is okay if M does not have the same taste but different taste." Smy speaks as a matter of others. However, after hearing M's words, Smy realized that making miso was neither a simple thing nor an annual routine work. In addition, Smy learned that even M, who has been making miso for years, is prepared to change the taste of miso depending on the season, weather, and temperature, and accepts that the taste will change. As a result, it is probable that Smy faced the question "Why is M worried?", and said "M never gets tired" of making miso. In other words, through M, Smy knows the way of life of miso making craftsmen and also learns about labor (absorption of occupational view).

Learning about profession and labor in social studies is not unique to Japan. For example, in the Curriculum (2013) of Social Studies in Ontario, Canada, there are 22 "jobs", 168 "work", 2 "occupation", 25 "industry", 1 "labor", and 8 places of "career". In Curriculum, as an example of a teacher's question to a child, "What are some things that the forestry industry has done to help manage forests? Are these actions enough to preserve forests for future use? If not, what else do you think should be "What are some of the things you and your family can do to live in a more sustainable way?" "What can satellite images reveal about the impact of an industry on a region?" "What type of information might you be able to gather by interviewing an Elder?" And so on. From these teachers' questions, we can see that there is a difference between asking "why" in Japan and asking "what" in Ontario. It's not the good or the bad, it's the differences in what and how each curriculum wants to learn. Rather, it is important to know that, regardless of culture or society, elementary school social studies have the potential to teach children about profession and labor. Although the Ontario curriculum is shown here as an example, it is necessary to compare the curriculum guidelines of social studies in various countries and explore the possibility of fostering a view of profession and a view of labor. This is a future issue. The author needs to classify formal vocational learning such as practical and vocational subjects, semi-formal vocational learning such as career education in elementary school, and hidden vocational learning such as social studies. It is also necessary to consider how they relate to the connection from primary education to secondary education to higher education. These are also future issues.

Acknowledgment

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Integrative Literature Review on Effectiveness of K-12 Engineering Education

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Abstract An integrative literature review was performed to research the empirical effectiveness of engineering education for different school levels in K-12 using the analysis framework based on the theoretical reviews. The effectiveness could be categorized as enhancing mathematical and scientific knowledge, understanding of and ability to apply engineering design, increasing technological literacy, and interest in engineering and engineer as career. There could be effectiveness of engineering design on the understanding of mathematical and scientific knowledge for the specific or limited topics. Focusing on the elements of engineering design or cognitive process of the students is more effective approach to increase the ability of engineering design. The knowledge of and attitude for technology and engineering, and intervention of teacher were also very important to increase effectiveness of engineering education. It was obvious that the factors which make the effectiveness engineering education for K-12 differ depending on the school levels. This study could show a systematical insight of the effectiveness of engineering education for different school levels and offer a reference tool for the teachers at the school for effective and efficient engineering education.

Keywords Literature review; effectiveness; engineering education; K-12; school level

1. Introduction

1.1 Background

It is very important to produce engineers, with competencies compatible for industry demands, who can contribute development of technologies which are necessary for enrichment of industries as well as country. To foster the engineers with required competency, a substantial education at the university level has been stressed, on the other hand, engineering education at K-12 level has been emphasized as well. In order to emphasize and enhance engineering education at K-12 level, International Technology and Engineering Educators Association (ITEEA) included engineering education as a part of technological education in Standards for Technological Literacy published on 2000 (ITEEA, 2007) and NAE&NRC has been studied for applying engineering education at K-12 level and published several related reports as well. Researchers have been also studied engineering education at K-12 level from the several point of views such as enhancing STEM abilities, increasing technological literacies, improving engineering

competency as a potential engineer, and so on. These various approaches to the engineering education at K-12 level also showed the various and different effectiveness of engineering education. Although there have been a lot of studies on engineering education at K-12 level, they could provide the effectiveness of engineering education for specific purpose at the limited school level. Moreover, the effectiveness of engineering education can be different depending on the school levels even though the same approach was applied. It is very important to inform teachers at school fields of adequate teaching methods and contents compatible for corresponding school level to acquire the effectiveness of engineering education. However, there have not been a systematical approach which studies the effectiveness of engineering education considering and comparing with school levels. Therefore, it is necessary to build a systematical study for the empirical results about the effectiveness of engineering education considering different school levels.

1.2 Research questions

This study aimed for offering of information which is helpful to apply engineering education to the practice by analyzing the literatures on engineering education for K-12 and then finding the effectiveness classified by school levels. The detailed research questions were as follows:

Research question 1. How do the effectiveness of engineering education for K-12 be classified?

Research question 2. What are the factors which make the effectiveness on engineering education for K-12?

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Research question 3. How do the factors which make the effectiveness on engineering education for K-12 differ depending on the school levels?

1.3 Definition of terms

Engineering education: In this study, the engineering education is limited to that for K-12 for the education of the general knowledge not for the education aimed for the production of engineering related workforces such as engineers.

Effectiveness of engineering education: The educational effectiveness by the engineering related class performed as a part of STEM or technology education, or engineering education.

1.4 Limitation of the study

This study does not include all the literatures on the effectiveness of the engineering education, therefore it does not include all the results about the effectiveness of the engineering education. Although engineering education is also offered in the technical high schools, it aims for production of workforce or for vocational purpose, therefore it was excluded in this study.

2. Theoretical background

2.1 Concept of engineering

Although engineering in a wide sense is defined with slight difference depending on researchers, institutes, or academic associations, engineering is differentiated from science and technology, and can be defined as a process of development of technology useful for human life and our society using mathematical, scientific and technological knowledge in general. However, because of convergence and diversification of disciplines, there could be overlaps of science, technology, and engineering (MDE, 2006). From the viewpoint of work forces development, differentiation of engineering from technology can be more ambiguous. For example, engineering technologist come from a kind of bridge or intermediate concept between engineering and technology. Technology education also had included engineering design by extending the range of technology education (ITEEA, 2007), therefore differentiation of engineering education from technology education became ambiguous as well (Fantz & Katsiloudis, 2011; Journal of Technology Education (Editor), 2012).

The narrow concept of engineering focuses on the process of engineering including engineering design consisting of the factors (Agogino et al, 2005; Carr et al, 2012; Hailey et al, 2005; Kelly, 2008; NAE & NRC, 2009, 2010): 1) engineering design for problem solving;

2) usage of mathematics, science, and technology; 3) system thinking of design thinking; 4) constraints; 5) optimization; 6) analysis; 7) iteration, which are required in development of technologies in industries and consequently are required in engineering education for the purpose of developing the engineering related work forces. Therefore, engineering education for K-12 should be approached as a concept of engineering in wide sense with a purpose of general education, but include the elements of engineering design which are core concept of engineering.

2.2 Concept of engineering education for K-12

The purposes of engineering education for K-12 level include offering information as a guide for engineering related careers, learning the fundamental knowledge required for future engineers, knowing importance and role of engineering as a process of development of technology, enhancing the problem -solving skill based on engineering design, STEM thinking and competency, and so on (ITEEA, 2007; NAE & NRC, 2009). In the case of United States, engineering education for K-12 is for general education, not for production of engineering related work forces, which mean that engineering education for K-12 should be educated adequate for the school levels. Nevertheless, the elements of engineering design, which are the core concept in engineering process, should be included in engineering education (ITEEA, 2007; NAE & NRC, 2009, 2010, 2012, 2013).

2.3 Purpose and effectiveness of engineering education for K-12

NAE&NRC (2009) presented the benefits of engineering education for K-12 by analyzing previous researches on engineering education: increased awareness of engineering and work of engineers; understanding and ability of engineering design; interest in engineering career; increased technological literacy. ITEEA (2007) presented Standards for Technological Literacy and the engineering education focusing on engineering design was included in these standards. They included 'designed world' and 'engineering design'. Integrating the elements of engineering education for K-12 presented in NAE&NRC (2009) and ITEEA (2007) gives Table 1. As shown Table 1, the elements of engineering education for K-12 can be categorized as 1) enhancing mathematical and scientific knowledge; 2) understanding of engineering and work of engineers; 3) increasing technological literacy; 4) understanding engineering design; 5) ability to apply engineering design; 6) interest in

engineer as career. NAE&NRC (2009) presented all the elements, on the other hand, ITEEA (2007) did not include engineer as career. This is because Standards for

Technological Literacy is basically for the technology education. However, increasing interest in pursuing engineering as a career is emphasized to guide students to

Table 1 Integration of elements of engineering education for K-12 presented in NAE&NRC (2009) and ITEEA (2007)

Categories	NAE&NRC (2009)	ITEEA (2007)
Enhancing mathematical and scientific knowledge	Improved learning and achievement in science and mathematics - real-world problem - increased mathematical thinking by engineering design - STEM	Technological studies as integrator
Understanding of engineering and work of engineers	Increased awareness of engineering and the work of engineers	Learning about technology
Increasing technological literacy	Increased technological literacy	Learning about technology Technological literacy Nature of technology - characteristics and scope - core concept Designed world - medical technologies - agricultural and biotechnologies - energy and power technologies - information and communication technologies - transportation technologies - manufacturing technologies - construction technologies
Understanding engineering	Understanding of engineering	Engineering design

Table 2 Categories of the effectiveness of engineering education for K-12 used in literature review

No.	Categories
1	Enhancing mathematical and scientific knowledge
2	Understanding of and ability to apply engineering design
3	Increasing technological literacy
4	Interest in engineering and engineer as career

an engineering career at the K-12 level (NAE&NRC, 2009, 2010), therefore, interest in engineer as career was included as an element of engineering education for K-12 in this study.

3. Research method

3.1 Analysis framework

Based on the approach suggested by Torraco (2005), the integrative literature review to analyze the effectiveness of engineering education for K-12 was performed. To categorize literatures and analyze the effectiveness of engineering education presented in the contents of the literatures, analysis framework of Table 2 was used based on the Table 1 which was induced from theoretical review. 'Understanding engineering design' and 'Ability to apply engineering design' of Table 1 was merged to 'Understanding of and ability to apply engineering design' because application of engineering design is generally followed by understanding of engineering design. 'Interest in engineering and engineer as career' of Table 2 included 'Understanding of engineering and work of engineers' as well as 'Interest in engineer as career' of Table 1 because these are related with work of engineers.

3.2 Literature collection and analysis

The literatures reviewed were limited to Journal of Engineering Education (JEE) and Journal of Technology Education (JTE). JEE is the representative peer-reviewed journal in the field of engineering education, and JTE is the representative a peer-reviewed journal published by ITEEA and has published research papers about engineering education increasingly since 2000. All the papers of JEE and JTE were surveyed with the limited time period from 2000 to 2020. A total of 41 papers – focusing on the empirical studies on effectiveness of engineering education targeting at K-12 students and excluding those for development of program, curriculum, or teaching tools – were selected and analyzed. Including overlap of topics, there were 11 papers dealing with the improvement of science and mathematical achievement, 17 papers for understanding and application of engineering design, 18 papers about understanding an engineering and technological literacy, and only five papers about increase of interests in engineering and technology.

4. Results

4.1 Enhancing mathematical and scientific knowledge

As a method to enhance the mathematical and scientific knowledge, almost researches exploited engineering design. Although there were differences in the level of contents between school levels, it was common that the mathematical or scientific knowledge was related through activity or curriculum of engineering design.

For the elementary school level, engineering design was exploited for the understanding of relatively simple scientific concept. For example, Wendell & Rogers (2013) reported that science class using LEGO engineering design contents increased performance of students to understand the design, construct, and test solutions to engineering problems, and Kelley & Sung (2017) presented the increased understanding of the concept of mass conservation in engineering design activity in science class. Ortiz (2015) also used LEGO robotics in engineering design to increase the understanding the

mathematical concepts. On the other hand, as shown in the study of Kelley & Sung (2017), elementary students had a difficulty in inversely applying the mathematical or science knowledge to engineering design process. An interesting result showed that design technology increased interest and ability of fifth grade students to write poem when the engineering design elements including iteration and creative design were introduced in poetry class (Koch & Feingold, 2006).

At the middle school level, engineering design was effective for some topics in mathematics or science. For example, Adventure Engineering (AE) was supportive to enhance the mathematical and scientific knowledge(Mooney & Laubach, 2002), using technological and engineering design as a topic of bedroom design increased the mathematical knowledge such as the concept of proportion, geometry, and scale in the mathematics class(Burghardt et al, 2010), and design based learning for the topic of circuit in the science class increased the performance and engagement of students in the class (Doppelt et al, 2008). Selcen Guzey & Aranda (2017) claimed that the discourse-based engineering design showed differences of discursive patterns as well as design decisions depending on students' groups, moreover, instructor's discourse affected the student engagement and scientific reasoning.

In the case of high school level, similarly in the case of middle school, engineering design was effective for some topics in mathematics or science. In the study of Nathan et al (2013), the project-based circuit class, in which the equation or graph was used to express the cohesion of physical law to mathematical formulation, was effective to understand the physical concepts. On the other hand, Dixon & Brown (2012) claimed that Project Lead the Way (PLTW) was effective for increase in ability of engineering design but not for increase in mathematical and scientific knowledge. Tran & Nathan (2010) also presented the similar result that applying PLTW did not bring out enhancement of performance in mathematics and science.

4.2 Understanding of and ability to apply engineering design

As a core element in engineering education, there were many researches for the understanding and applying engineering design.

The many researches mainly focused on the understanding of elements of engineering design for the elementary school level. Wendell et al (2017) analyzed the discourse of the students in discourse-based engineering class to find that the decision-making process included presentation of various solutions, evaluation of pros and cons, selection of the solution, analysis of the solution, purposeful improvement, and so on. It was emphasized that the intervention of teachers was very helpful to have students learn the engineering design concept (Gustafson et al, 2007; MacDonald & Gustafson, 2004; Parkinson, 2001). It was remarkable that even using simple drawing rather than making something was also useful for understanding and ability of engineering design (Gustafson et al, 2007; MacDonald & Gustafson, 2004).

For the middle school level, there were some studies, that used the learning tools to have an effectiveness in engineering design, such as the study of Dasgupta (2019) where Improvable Model (IM) was used to enhance the ability of engineering design, the study of Lavonen et al (2001) where programming using program tool of icon types was supportive to have the students learn control theory and solve problems. Marks & Chase (2019) claimed that design thinking and iterative prototyping were helpful to result in the better design, and the intervention of teacher was an important role in this process. Bartholomew et al (2017) claimed that using mobile devices affected design portfolio but did increase the quality of the design result. The similar result was also found in Pieper & Mentzer (2013) that internet surveying was less effective in time than paper survey to find information for engineering design class.

In the case of high school level, the researchers focused on the detailed elements or cognitive processes of engineering education because it was debatable whether engineering design as a whole program was effective. For example, in the study of Dixon & Brown (2012), it was presented that Project Lead the Way (PLTW) was helpful for ability of engineering design, on the other hand, in the study of Wells et al (2016), it was claimed that there was no difference in ability to make design solutions between the students who completed engineering class or not. Kelley (2008) also claimed that there was difference, in solving process for given ill-defined problems, of the students who completed two different types of engineering design program, or PLTW and National Center for Engineering and Technology Education (NCETE). As an elements of engineering design, a system thinking was analyzed from the viewpoint of Function-Behavior-Structure (FBS) to claim that engineering class should consider FBS cognitive process to increase system thinking and design ability (Lammi & Becker, 2013). The engineering class that emphasized the constraints, optimization, and predictive analysis increased design ability (Merrill et al, 2008). Walmsley (2003) compared 3 different class types or design-based, skill-based, and combination of two, and claimed that the student-driven method was not effective for skill-based

class but student-teacher partnership was important.

4.3 Increasing technological literacy

In engineering education, especially for engineering design, necessary is technological literacy which is used and useful for the understanding of engineering concepts as well as design process. For this reason, learning for acquiring technological literacy as well as engineering concepts in the level of elementary school was emphasized. The examples were the study of Järvinen et al (2007) in which they presented that making a product using microcontroller technology was helpful to acquire the technological knowledge as well as to induce a creative idea, and the study of Twyford & Järvinen (2000) where it was shown that the nodding toy was supportive to understand the concept of counterweight. Gustafson et al (2000) used drawing of bridges rather than making something or using technological tools to teach not only the concept but also the test method of strength which was very important in bridge design. Davis et al (2002) also found that students understood the concept of strength and stability of structures and products when the pictures of bridges, bicycles, and bags with different materials were used in the class. These results imply that using simple tools such as pictures and drawings without using teaching aids or making products is effective method to understand the technological literacy and engineering concepts. Davis et al (2002) claimed that cognitive ability of students for technological and engineering concepts showed big difference between students and varied with ages, therefore teachers should consider these in the class.

At the levels of middle and high school, there were many researches on interest and achievement of the students. A work that focused on the activities of students by Taylor (2006) showed that the community activities of middle and high school students such as Technology Student Association (TSA) had an effectiveness on increase of acquiring technological and engineering literacy. Many studies dealt with the difference of interests between male and female students. For example, it was notified that male students had more interest in technology education than female students, and the topics in which they were interested varied depending on gender (Weber & Custer, 2005). And Walach (2015) presented that male students marked the higher scores than female students in the tests for the understanding of technological and engineering literacy, and also presented that there were some subjects, such as bio, medical, and agricultural engineering, that showed relatively small gap of scores between male and female students. The work of Reisslein et al (2006) considered the difference of

ability of students and showed that the adaptive fading, in which the students could proceed to the next step after they understood the present step, was more effective in retention and achievement of the students. Besides, there was also a study that emphasized the role of teacher to inspire students' confidence in engineering class (Davies, 2000).

4.4 Interest in engineering and engineer as career

About engineering and engineering related jobs, there showed prejudice such as blue color or male, and lower interest of female students rather than male students regardless of ages.

The elementary school students recognized engineers as mechanic, laborer and technician who did fixing, building, or manufacturing cars, and as male's jobs when they were asked to express engineers by drawings (Duncan et al, 2011). In the study of Weber (2012) targeting for middle and high school students, it was presented that the female students showed lower participation than male students in the topics such as conventional technologies and mechanics in engineering and technological class, on the other hand, the male and female students showed the similar participation in the real-life related topics. Moreover, it was also shown that the female students did not choose engineer as a career because of gender bias from the image of technology and engineering. Moote et al (2020) also studied the effects of personal factors and attitude of middle and high school students on the aspiration for science and engineering and found that the gender was the most significant factor that affected the aspiration for engineering, on the other hand, several factors similarly affected the aspiration for science. Therefore, they claimed that the factors, that affected perception of engineering, such as prejudice and elitism about engineering should be eliminated in order to raise aspiration of students for engineering. Johnston et al (2019) presented that the talks by teachers or experts in the field of engineering increased the interest of female students in engineering and technology, but engineering/technology class did not, and Cantrell & Ewing-Taylor (2009) found that the seminars by scientist and engineers increased the understanding of engineering and science, and the understanding and interest of STEM. Moreover, it was also helpful, especially for the female students, to understand the engineer and scientist as a career.

5. Discussion and implications

In order to enhance mathematical and scientific

knowledge through technology and engineering education, engineering design was used in all the school levels of K-12. This is because engineering design is necessarily included as an element of STEM (Burghardt et al, 2010; Dyer et al, 2006; Kelley & Sung, 2017; Nathan et al, 2013), or one of the learning objectives is to increase mathematical and scientific knowledge through design-based problem solving in the class using commercial teaching aids (Culbertson et al, 2004; Mooney & Laubach, 2002; Ortiz, 2015; Wendell & Rogers, 2013). The engineering design results in the enhancement of mathematical and scientific knowledge for the specific topics or simple concepts dealt in low school level but not for whole school levels. Moreover, there is no clear proof that engineering design program such as Project Lead the Way (PLTW), which is one of the engineering design programs, increases the student's ability of mathematics and science (Dixon & Brown, 2012; Tran & Nathan, 2010). This can be seen that as the school age increases, it requires higher cognitive level to understand the higher levels of mathematical and scientific knowledge, however, the problem solving based on engineering design has a little effectiveness on the understanding of such a high level of knowledge. In short, engineering design has a limitation to enhance mathematical and scientific knowledge for topics and levels, therefore, it should be careful to use engineering design in the class for this purpose considering cost and time for a secure of teacher with competence, development of teaching aids and curriculum, etc.

Regarding the understanding of and ability to apply engineering design, simple drawing or talk related with engineering design has an effectiveness on the elementary school level, and engineering design using teaching tools or computer is useful at the level of middle school. However, it is debatable that engineering design curriculum only has an effectiveness on the ability of engineering design as a whole. Instead, it is effective to focus on the element of engineering design and cognitive process, and the development and careful application of engineering education program adequate for school ages is more important.

There is significant difference in interest in technology and engineering depending on gender, but there are also some topics in which this difference by gender is relatively small, therefore balanced contents should be considered in technology/engineering education. Moreover, the intervention and help of teacher, relationship between teacher and students, and recognition of achievement difference of students becomes more important as the school age increases, which mean that the teacher's more endeavor is required in engineering education. The male image or prejudice, and dislike of female students for technology and engineering are very evident regardless of ages, moreover, technology and engineering education in class may increase aversion for technology and engineering. On the other hand, talks by experts in the fields of engineering and technology are very helpful for the understanding of engineering and engineering related jobs, therefore, it is worthy of using talks by experts in technology/engineering classes.

6. Conclusions and Recommendations

6.1 Conclusions

In this paper, the effectiveness of engineering education for K-12 was analyzed by integrative literature review. The result is the following:

First, the effectiveness of engineering education for K-12 can be categorized as enhancing mathematical and scientific knowledge, understanding of and ability to apply engineering design, and increasing technological literacy and interest in engineering and engineer as a career.

Second, regarding the factors which make the effectiveness on engineering education for K-12, there can be effectiveness of engineering design on the understanding of mathematical and scientific knowledge for the specific or limited topics. On the other hand, engineering design program or curriculum as a whole does not necessarily have an effectiveness on the enhancement of acquiring the mathematical and scientific knowledge, and understanding of engineering design. However, focusing on the elements of engineering design or cognitive process of the students is more effective approach to increase the ability of engineering design. Overall, knowledge of and attitude for technology and engineering, and intervention of teacher are very important to acquire effectiveness of engineering education.

Lastly, the factors which make the effectiveness engineering education for K-12 differ depending on the school levels. For example, using simple drawings or talks in engineering class is useful for understanding mathematical and scientific knowledge as well as engineering design at the elementary school level, but even engineering design program or curriculum does not show an apparent effectiveness on enhancement of understanding mathematical and scientific knowledge or ability of engineering design.

6.2 Recommendations

From the results and conclusions of this study, the future direction of engineering education as well as related study can be suggested as follows:

Many researches focus on enhancement of ability of engineering design by applying engineering education program or curriculum as a whole. Although some researches have interests in the elements of engineering design or cognitive process of students, there is still a little empirical study to investigate which factors among the elements of engineering education affect which ability among the engineering competency effectively and efficiently. Therefore, it is required to study the effectiveness of engineering education systematically based on empirical approaches considering the school levels. Moreover, the engineering education program or engineering camps for K-12 should consider the difference of ages as well as the differences between students and be designed focusing on the elements of engineering design and cognitive process.

It is required that the engineering education for K-12 includes the purpose of general education as a general knowledge as well as the purpose of education for future engineers. This means that the balance of engineering contents, increase of interest in engineering and technology, and making the clear and logical relationship of engineering with mathematics and science are required. It is important to keep the students being interested in technology and engineering class, and to find and offer the more advanced engineering education for the future engineers, which can increase the recognition on engineering and engineer, and foster the possible engineers from the phases of K-12.

It is very important for the teacher to increase a competency of teaching engineering education. As shown in many researches, teachers' understanding of and attitude toward engineering and technology are significant factors in engineering education class, and intervention and support of teachers are very helpful for acquiring learning objectives. Therefore, in order to increase effectiveness of engineering education, it is required to foster the teachers who have the competency of engineering education or to have the teachers this competency. Most of all, the competency required for the teacher who is involved in engineering education should be recognized by empirical study.

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A Study on Vocational and Career Education in California Charter Schools - How Charter Schools Use Resources Provided by CMOs

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Abstract The purpose of this study is to examine the practices of vocational and career education in California charter schools, based on the data collected by fieldwork. Especially, this study focuses on how charter schools use the resources provided by Charter Management Organizations (CMOs) for vocational and career education. Also, charter schools tend to be opened and operated at the areas which has socioeconomically difficulties, and students are facing low achievement or inappropriate educational environment and they are not able to imagine/design their career. This study will discuss about the contribution and issues through the data of California charter schools and then reveals how CMOs influence students' achievement or vocational and career education. The following are the findings.

1) With the relations with CMOs, Charter schools develop better vocational and career educational plans and promote professional skills by providing them rich resources. Charter schools and CMOs are important contributors to training and development, particularly in low economic areas.

2) In order to develop higher educational services, these schools are able to share their autonomous lessons or educational experiences with other charter schools under the huge network created by CMOs. In schools with difficulties among students and parents, sharing those educational practices about vocational and career education are necessary for similar schools or communities.

3) However, there exist hierarchical relations or power structures between charter schools and CMOs that influence decision-making, personnel management, and school operations in their entirety. Even though the charter school system is established against the inefficiency of public- school system run by public bodies, CMOs operating charter schools is seen as another school governing system.

Keywords charter school, CMOs, public-private partnership, career education

1. Introduction

The purpose of this study is to examine the function of the network between charter schools and charter management organizations (CMOs) to determine the influence of CMOs on vocational and career education. CMOs are non-profit organizations that establish, operate, or support charter schools. Since this trend is akin to the privatization of education, this study discusses the impact of privatizing education by considering the charter school network, especially in vocational and career education, under CMOs. In 1991, the Minnesota State legislated for the creation of charter schools. Although charter schools are public schools, they are not restricted by public entities such as the state, county, or even school district (Nathan, 1996). Easing the regulations on charter schools has made CMOs key players in sharing better educational practices and providing various resources through the charter school network, such as curriculum development, class instructions, and personnel management, and in improving the learning environment (Ravish, 2013). This study focuses on how CMOs create a charter school network and how the network affects vocational and career education, specifically in the use of resources, curriculum design, and teaching methodologies. First, the number of charter schools and the role of CMOs are presented to understand their development. Second, the framework for CMOs and charter schools is discussed. This study conducts a data analysis to examine the process by which CMOs force charter schools to adopt their viewpoints with regard to the vocational and career education developed by the charter schools.

2. The traits of charter schools and CMOs

As mentioned above, Minnesota legislated charter schools in 1991. Since then, the number of charter schools has increased, and there are now more than 3

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million students attending nearly 7,200 charter schools in the U.S (the National Center for Education Statistics). One of the most remarkable traits of charter schools is that they are free from many regulations of states, school districts, or counties. Although charter schools are public schools, they can improve or promote their educational practices (for example, school mission or goals, curricula, personnel, class-size, and teaching materials) with their responsibilities, so charter schools are seen as "hybrid schools of public and private" (Robertson et al., 2012). One of the traits of charter schools is free from public entities. It means that they are able to operate by themselves and obtain highly autonomy among whole school operation. According to Wohlstetter et al. (1995,2004), the autonomy of charter schools is based on the fact that "they are not regulated by public bodies" and "decision making is done in the schools themselves". Moreover, in the California charter school law, the autonomy of charter schools is supposed to be "different" and "innovative". From those perspective, the autonomy of charter schools in California are defined as the following characteristics.

1)Free. 2) School-based decision making. 3)Different. 4) Innovative.

On the other hand, CMOs are non-profit organizations. They provide various forms of support to charter schools as professional organizations for school management, curriculum development, or fund raising. In many cases, charter schools face difficulties in school management or financial risk due to a lack of support from public entities (Furgason, 2012; Lake, 2010; Finn

et al., 2000). Many CMOs were created in order to replicate educational approaches. Attracting substantial philanthropic support, CMOs charter schools have grown rapidly in the past decade. Some of these organizations have received laudatory attention through anecdotal reports of the achievement results.

Some of the roles of CMOs are the same as those of the school district in the past. However, with the tide of privatization of education in the 1990s, CMOs have increased, and students' achievement in charter schools run by CMOs tends to be better than in other public schools. The framework of CMOs and charter schools is shown in Figure 1. As expressed above, the state or school district authorizes or oversees CMOs as charter school operators. On the other hand, CMOs have to show sufficient results or fiscal conditions. CMOs operate and control charter schools (in California, at least three charter schools). Each charter school must meet the requirements of state standard testing or accomplish their own school goals; thus, CMOs must share better educational practices in their charter schools in order to improve their schools' quality.

This framework is regarded as public-private partnership which is one of the main tides of charter schools. As it is said, charter schools' management is free from many regulations of public bodies, such as state or school districts. Some critics contend that philanthropy plays an outsized role in supporting charters and regard those money as pushing public education ever closer to privatization. and the other criticism is about school gap. For instance, in the long run, privatizations assume that
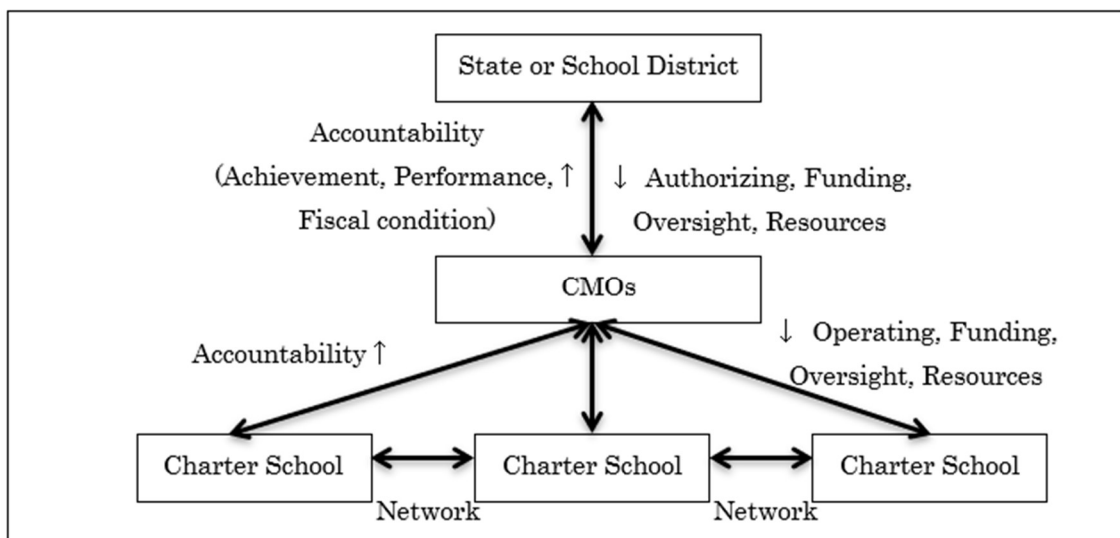

Figure.1 The Framework of CMOs and charter schools

Table 1. Data collected in the fieldwork

Charter School 1(Est.1996)

· Number of students : 201(Hispanic or Latino: 92%, African American: 4%, others:4)

· Number of teachers : 14   · Grade : K-9   · API Results(Standardized Test): 938 (out of 1,000)

· Interviewees: ①principal(56), female,   ②7rd grade teacher(44), female

Charter School 2 (Est.1993)

· Number of students : 766(Hispanic or Latino:44%, African American: 34%, White:15, others:8%)

· Number of teachers : 41   · Grade : K-9   · API Results(Standardized Test):925 (out of 1,000)

· Interviewees: ③principal(52), female,   ④8th grade teacher(47), female

CMOs A (Est.2001)

Mission:

1. To support for better learning environment (at-risk students).

2. To provide high quality educational service and vocational opportunity.

3. To expanding regional contribution through our school network.

· Interviewees: ⑤head of school management division(42), male,

⑥a staff of school management division (34), female,

⑦head of curriculum development division (51), male

⑧head of school support division (46), female

entrepreneurs, drawn by the possibilities of lucrative tuition payments, would offer alternatives to unpopular schools. As the results, weak schools would be eliminated, strong ones would appear in their place, and all schools would feel the pressure of competition to maintain quality. On the other hand, from the beginning of charter school system, it had been said that public schools are strongly criticized because of ineffectiveness of school operations under the district-run/ bureaucratic control. On the other hand, if charter schools need better resources or services, they try to get them not only from public bodies but also private organizations. In policy, adopting the culture of companies or for-profit/non-profit organizations for school operations are emphasized because of effectiveness (competitive pressure for other schools, cost-cut operations, parental satisfactions, various/innovative educational services and so on)

3. Data

This research uses the fieldwork data collected in Los Angeles, California in 2011. I show the detail in below.

Even though charter schools 1 and 2 are operated in low economic areas, both schools are effective schools in terms of student achievement. CMO A set three missions to be achieved by their charter schools, and in each division, there is professional staff to develop or improve all school operations. Since these staff work for or give advice to charter schools, charter school teachers have more time to spend with students or in the classroom.

4. The role of CMOs: overcoming the fiscal problems among charter

Table 2: Resources provided by CMO A to Charter school 1

Resources/services	For who/what
School uniform (summer/winter version)	All students
Desk (embedded Mac)	All students
Maintenance cost	33,600$
ESL (for parents) teacher salary	26,400$
Classroom rent for ESL	800$/a month
Software development cost	5,000$
Salary for extra reading, mathematics, and science teachers	Reading: 28,800$ Mathematics: 20,400$ Science:20,400$

schools

Charter schools and traditional public schools (district-run schools) draw their revenues from the same four main sources. Three are public: federal, state and local governments (like school districts). The fourth is private, comprising philanthropic grants, private contributions, earned income and investor dollars. In combination of these revenues, not only charter schools but also public school would be used as school's operating budget. In policy, discussions, this total is routinely divided by a school's enrollment and restated as per-pupil revenue. That numbers ordinarily rises and falls with several variables, including which state and district the school is in, the grades that it serves, and its students' special needs. For present purposes, what matters is that per-pupil funding also varies by school type-that is, charter or district-run.

The biggest fiscal challenges faced by charters is that they seldom share in the funds that local districts raise to supplement their state and federal dollars. Those moneys come from municipal or county taxes, which are often property-based and levy-generated. However, under most state legislations, charters schools cannot access such locally generated dollars, even when they're located within district boundaries and enroll children who would otherwise attend district-operated schools. And in place where charters have some access to local dollars, the per-pupil portion is almost always less than district schools receive. The absence of adequate capital funding means that charter schools must often cover the cost of their facilities from within their already-strapped operating budget or other fund-raising activities in order to obtain private resources or money. For these fiscal limitations among charter schools, CMOs have been taking a really important role for at-risk students within low socioeconomic areas.

The resources provided by CMOs for charter school 1 and charter school 2 are table 2, and 3.

In charter school 1, school got many resources in order to improve not only students' achievement, but also promote parents' English literacy. Most of all students in this charter school are Hispanic or Latino, which means that their first language is not English, including their parents. These resources or support would not be provided from public entities because these services or salaries are extra. Then we found out many of them are about promoting school environment. In addition, in charter school 2, this school get extra teachers' salaries from CMO A. Same as charters school 1, the area where this school is operated has socio-economic difficulties, such as low achievement, high dropout rate, unemployment, and poor security. However, this charter school 2 focus on students' achievement for each grader and special needs.

5. The Practices of Vocational and Career Education

Focusing on the practices of vocational and career education, CMO A use their networks to introduce many role models who graduated from each charter school. Some of them are professionals such as doctors, lawyers, business leaders, and systems engineers. Others are high school or college students. All of them talk to students about their experiences when they were charter school students. Moreover, as an internship practice, students from 7th to 9th grade visit a hospital, law office, high

Table 3: Resources provided by CMO A to Charter school 2

Resources/services	For who/what
Extra teacher salary (for lower grades)	25 teachers: 120,042$ (10 hours / a week)
Extra teacher salary (for upper grades)	8 teachers: 46,683$ (15 hours / a week)
Extra teacher salary (for special needs education)	3 teachers: 8,000$ (6 hours / a week)
Extra teacher salary (for upper grade science)	12,250$ (10.5 hours / a week)
Teacher allowances	41 teachers: 12,300$ (300$ each)
Technical support	28,000$
Material cost (Drama, P.E, Dance, Arts, Music)	Drama: 7,800$ P.E.: 35,735$ Dance: 8,417$ Arts: 23,000$ Music:13,540$
Total	318,147$

school, or college several times in one semester to encounter and become familiar with non-elementary-school cultures (interviewees 1, 2). These practices are difficult for ordinary public schools (public schools run and controlled by school districts). Since charter schools are public schools, students must study hard to meet state standards (reading, mathematics, social arts, computer, etc.) each year. In addition, CMO charter schools provide many opportunities for students to think about their own careers or jobs in the future (interviewees 3, 4).

In their additional vocational and career educational practices, both CMO A and each charter schools set the task of "climbing the college mountain." Even though both charter schools are elementary/middle schools, they require students to graduate from college as their career. In order to accomplish this goal, each school focuses on securing their parents' help. As most of the parents are immigrants whose first language is not English but Spanish, the schools developed an English course for parents. To promote students' educational achievement and improve the quality of their daily lives, charter schools must consider how to change their parents' minds. Charter schools try to help students find and

enter their career with the help of their parents or their community.

6. Conclusion

For sure, these schools show the good results, and it is really important and positive impact to share effective services among schools. The history of charter school had begun from the criticism of red tape/ control by public entities which arise the bureaucratic inefficiency or disturb effective educational practices. Since CMOs are the founder and the operator of charter schools, they have authority to decide whole school operations or practices. So, it is free for CMOs to have or expand network with other private organizations. From the view of the policy intention, private organizations or companies are seen as the entities that promote efficiency because they tend to give a quick response to customers for profit. In education, these legerity, flexibility, and cost-cutting strategy are needed.

Mainly provided service by CMOs comes from three roots when their charter schools require.
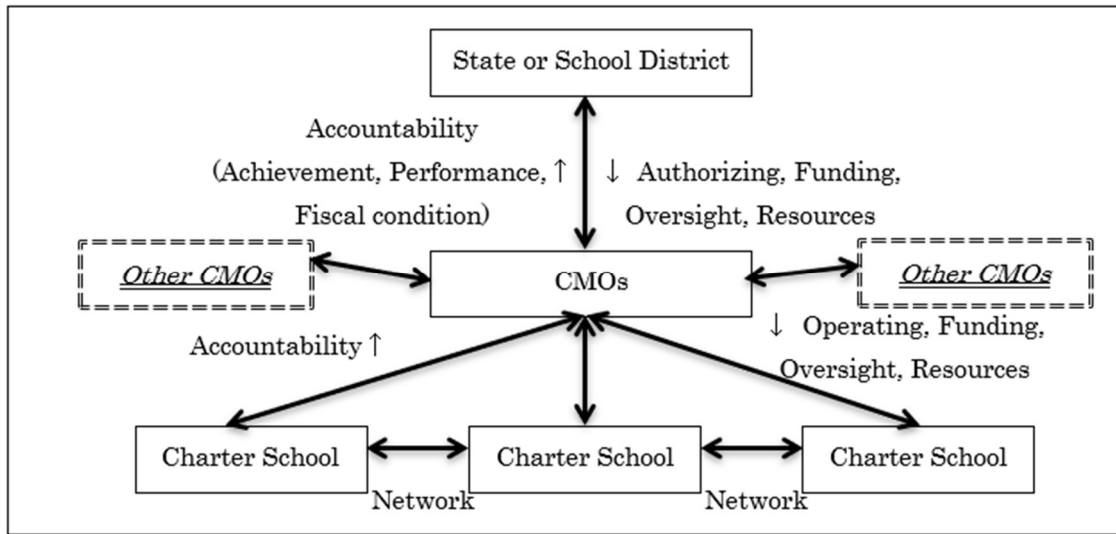
Figure.2 The relationship between CMOs (other organizations)

1. CMOs can provide by themselves, using human/physical or financial resources they have.

2. CMOs negotiate with public bodies like school district or state for those support.

3. CMOs get those services from other organizations (especially private organizations).

Then, according to career education, the following are the findings of this study.

With the relations with CMO A, each charter school have developed better vocational and career educational plans (keeping discipline, aim for college, and computer-assisted instructions) and promote professional skills by providing them rich resources. Charter schools and CMO A are important contributors to training and development, particularly in low economic areas.

In order to develop higher educational services, each charter school had a huge network with not only CMO A, but also outside organizations for vocational and career education. Therefore, these schools are able to share their autonomous lessons or educational experiences with other charter schools. In schools with difficulties among students and parents, sharing those educational practices about vocational and career education is necessary for similar schools or communities. However, there exist hierarchical relations or power structures between charter schools and CMO A that influence decision-making, personnel management, and school operations in their entirety. Even though the charter school system is established against the inefficiency of public-school system run by public bodies, operating charter school operation by CMO A is seen as another school governing system (see the figure 2, boxes of dotted line). In that point, the network created by CMOs A includes the possibilities of a new control system of public schools, under providing the resources or supports for their charter schools. But charter schools don't know where those services came from. As an interviewee mentioned, CMO A don't always give a quick response to charter schools.

The main reason is that CMO A have various network with other CMOs, private companies or foundations. A new school system of CMO A is remarkable and working well in order to improve charter school education. Teachers focus on their students more because CMO A support them through with many professional knowledge or skills. Also, most of the resources they provide are not covered from public bodies. And the network plays an important role for charter schools, too. But that network includes the problematic aspect.

1. The network pressure.

2. "Black box" of partnerships among CMOs.

For future work about the CMOs and charter school operation, system and practices, not only a vertically-structures relationship (public-private partnership), but also a horizontally-structures relationship=private-private partnership.

Acknowledgement

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A Comparative Study of Career Support Institutions for Vulnerable Young People in Japan and France: Significance and Issues from the Perspective of Social Justice

Tetsuo Kyomen[1]

Abstract In Japan, the Regional Youth Support Stations (RYSS) contribute to "recognitive justice" which means acknowledging the existence of minorities. However, the issues identified are weak cooperation with other institutions and insufficient consideration of culture for young people who have roots overseas. This paper aims to clarify the significance of the Career Guidance and Information Centers (CGIC) in France, from the perspective of social justice. Then, suggestions for the direction of the RYSS will be proposed by comparing with CGIC. As methodology, two results of fieldwork are analyzed from three viewpoints: recognition, culture, and collaboration. The CGIC, which are the third place for young people who are strained at home or school, support them towards self-determination. The counselors talk to immigrants by trying to connect the two cultures by helping them recall their experiences not only in France but also in their country of origin. The CGIC collaborate with various specialized agencies and schools. As a result of a comparison, four suggestions were obtained. The Japanese government needs to build the framework of cooperation and needs to develop qualitative evaluation indicators. Each RYSS should involve overall in career education for promotion of outreach and should practice "culture-infused counselling" for immigrants.

Keywords career support, social justice, recognition, culture, collaboration, Franco-Japanese comparison

Problem statement

In recent years, "social justice" has been a key concept in the research and practice of career guidance and counseling. The International Association for Educational and Vocational Guidance (IAEVG), for instance, published the "Communiqué on Social Justice" in 2013 and proclaimed that career practitioners must "reach out to those who seek alternative paths; members of non-dominant groups; those that may be placed at the margins of society; and others who may not readily access guidance support." In addition, the Japanese Society for the study of Career Education (JSSCE) also declared in 2018 that it will "handle the issue of social justice to achieve diversity, equity and equality in education and work." Social justice is an ambiguous concept, but it can be understood from three perspectives: retributive justice, distributive justice, and recognitive justice in the field of career support (Shimomura, 2020).

As efforts toward social justice are progressing at the practical level, this study focuses on career support for young people with various difficulties. In Japan, Regional Youth Support Stations (RYSS) were established in 2016 and are currently installed at about 160 locations

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nationwide. They provide "employment support, for example consultation by career counsellors, step up through communication training, and work experience in partner companies" for at-risk youth aged 15–39 (Ministry of Health, Labor and Welfare, 2017). Furthermore, Oyamada (2018) points out that RYSS are places where users can develop their own agencies and restore their self-esteem beyond just working; therefore, they contribute to "recognitive justice," which means acknowledging the existence of minorities and hearing their voice. However, some issues have been identified, such as their weak cooperation with other institutions, including schools ; only 6.6% of local governments have established a "child and youth development support area council," and only 6.9% have established a "child and youth general consultation center" that coordinates and introduces related organizations (Cabinet Office, 2015). Another problem is that the Japanese are assumed to be the users, with insufficient consideration of culture for young people who have roots overseas. The number of children needing Japanese language instruction is on the rise, and it is expected that their need for career support will further increase in the future.

In France, on the other hand, the network of career support institutions was strengthened, and the quality assurance system was also improved based on the Lifelong Career Guidance and Vocational Training Act in 2009 (Kyomen, 2014). In this network, two are the types of institutions equivalent to the RYSS in Japan: The Career Guidance and Information Center (CGIC) (Centre

d'Information et d'Orientation) for students and Local Mission (LM) (Mission Locale) for dropouts aged 16–25. This study focuses on the CGICs installed in 400 locations nationwide because they are the only organizations that can directly intervene in schools. CGICs located in rough areas have contributed to the realization of social justice by providing career counseling to immigrant youth.

The purpose and objectives of the study

This paper aims to clarify the significance of the CGIC from the perspective of social justice by considering the functions of the CGIC in career support for vulnerable young people, including immigrants. Then, suggestions for a future direction of the RYSS that could further contribute to social justice will be proposed through a comparison with CGIC. Career counselors, who belong to the CGIC, work at the center as well as at junior high schools and/or high schools. The general mission of CGIC and the actual cooperation between teacher and counselors in schools were clarified in research by Kyomen (2015a), but the significance of CGIC in terms of contributing to social justice was not considered.

Methodology

In this study, two results of fieldworks are analyzed from three viewpoints in social justice (1) recognition, (2) culture, and (3) collaboration, which are set in consideration of the problems of RYSS.

The first case is the Saint-Denis CGIC. The author visited it on February 27, 2020 and interviewed Director A. The city of Saint-Denis, located in the Seine-Saint-Denis prefecture in the suburbs of Paris, has been designated as a vulnerable area with an unemployment rate of 22.7% in 2017 (national average of 13.9%). The number of immigrants is large, and the CGIC accepts about 400 immigrant households a year. About 80% of youth accepted by an ordinary CGIC are students, and 20% are dropouts; however, only 30% in the Saint-Denis CGIC are students, and 70% are dropouts.

The second case is the Béziers CGIC. The author visited it on March 6, 2017, interviewed Director B and observed the practice of counseling for two young people. The city of Béziers, located in Hérault prefecture, where many underprivileged families and immigrants live, has low employment due to the lack of key industry. In the area under the jurisdiction of this CGIC, the unemployment rate in 2012 was as high as 21.9% (national

average 10.4%); further, 36.3% of junior high school students, 21.7% of general/technical high school students, and 47.1% of vocational high school students belong to the underprivileged class. Therefore, the repetition of the same academic year in elementary school and the withdrawal of vocational high school students have become serious problems (CIO Béziers, 2013).

As mentioned above, both cases are appropriate samples for verifying their functions toward social justice, because they have jurisdiction over areas where vulnerable young people are concentrated. Based on the survey results, a comparison between Japan and France will be conducted with reference to the practical theory of comparative education by Schriewer (1988), and "supplementary meaning" that shows the direction of Japan will be extrapolated by "externalization to world situations."

Results

Case 1: Saint-Denis CGIC

(1) Recognition

According to Director A, the CGIC is "the third place for young people who are strained at home or school." It is difficult for students to "look at their candid career aspirations and motivations" in schools because teachers who have a power relationship with students advise them based on their academic performance. If counselors belong to the schools, they stand with the teachers; thus, they aim to belong to independent organizations.

Counselors examine each client from a comprehensive perspective, such as their position in their family and their psychological tendencies, in the CGIC. Their support emphasizes "understanding," especially to "clarify what students want to do and what means they can take to achieve it." Various difficulties and problems always occur in life, but students can overcome them if they have a goal. Sometimes a gap exists between what they want to do and their abilities, such as when vocational high school students insist on becoming doctors or lawyers; the counselors do not impede their dreams, politely explaining to them that "they cannot reach his profession desired directly or immediately" and making them understand that they must first graduate from high school, gradually adapt to society, and take the time to approach the job that aligns with their wishes. In this way, counselors encourage young people to advance independently and continue to help them make better decisions.

(2) Culture

Counselors continue to support each immigrant who has a certain limitation in language and learning. A serious problem is that cultural barriers and the lack of cultural capital have narrowed their scope of activity; they see "glittering Paris as place that have nothing to do with them, or place outside their territory" and refuse to go even just two stations away from their town. They do not know how to buy a train ticket and go through the ticket gates because their family has not had this experience. Staying in Saint-Denis without moving to another area may reduce their chances of employment. The CGIC is the only environment outside the school that has access to culture. In fact, counselors not only display their understanding of immigrant culture, but the support they provide also helps them acquire a new culture.

(3) Collaboration

The CGIC works with schools, the city hall, and the Academy (Académie, i.e., educational administration) in reaching out to at-risk youth. Three are the main types of circumstances encouraging young people to go to the CGIC: a pattern prompted by a counselor working at their school; a pattern told by a teacher due to problems such as learning difficulties; and a pattern via the city hall in charge of life support for immigrants. In addition, lists of students who have graduated from junior high school are sent from the Academy to the CGIC, and the counselors visit all the families based on the list in order to understand the students' circumstances. If they do not want any support then, the counselors decide that it is not the right time. When "the time" comes, and the students wish to do something or take action, the counselors are there to support them.

The CGIC also forms a support platform by teaming up with LM, which are employment support institutions dedicated to dropouts. In fact, some young people go back and forth between the two institutions, and the counselors hold regular meetings to discuss their characteristics as well as the kind of support that they need. Especially between the age of 16 and 18, they are not ready to work in society; thus, before entering the training course provided by LM, they may have to spend one or two years solving academic problems and health problems (such as drug addiction). Although this is a long period for the young people involved, they can decide how to spend it in consultation with their counselors.

Case 2: Béziers CGIC

According to Director B, 2,800 career counseling sessions took place in the CGIC, and 3,850 sessions were held in schools in 2011; however, those efforts have not improved the situation in the region. Therefore, the target contract (contrat d'objectif) (2013–2016) consisting of the following three pillars was signed among three parties (the CGIC, Montpellier Academy, and Hérault prefecture) with the aim to:

· Reduce career disparities derived from social and geographical origins.

· Create conditions for successful admission to junior high school and high school.

· Reduce withdrawal from education or training courses.

At the end of the year, the CIO submits a huge amount of numerical data (such as the course decision rate), called "dashboard (tableau de bord)," which is checked to determine whether the plan based on the contract has been achieved. However, the outcome of career choice is different from that of counseling. Although Director B acknowledges the significance of the target contract, she is perplexed by the fact that the two are considered equal. In particular, the most important factor in career support is increasing the autonomy of young people, though it is difficult to evaluate it numerically.

With the above in mind, two counseling cases (case 2-a and 2-b) will be analyzed from three perspectives: (1) recognition, (2) culture, and (3) collaboration.

Case 2-a: Young immigrant from Algeria who came to France half a year ago (no French nationality)

Student X is currently enrolled in a special class at a vocational high school, studying French and attending vocational exploration workshops. He is prompted by his teacher to visit the CGIC for the first time, because he must decide which course to choose in the school curriculum in the near future. Table 1 outlines the interactions between students X and the counselor (marked as C).

Student X can hardly speak French and cannot understand simple words such as "agriculture" and "craftsman." The counselor explains the characteristics of each occupation patiently with a gentle tone. Student X repeats "There is nothing that I want to do" in his response, but the counselor does not recommend a particular occupation. Instead, the counselor carefully illustrates the qualifications and vocational courses in plain French as well as the content documented and hands it to him.

Table 1   Outline of the counseling

X: What occupations can I choose?

C: I cannot show all the occupations here. What occupational fields are you interested in?

X: I do not know. I am not interested in anything, and I do not understand the name of the occupations in the first place.

C: What about machinery? Or what about cooking and agriculture?

X: I hate machines because they cause accidents. I am not very interested in cooking. I do not know much about agriculture.

C: Did you not find occupations that are interesting to you at a high school workshop?

X: I did not find anything that I want to do.

C: Why did you come to France?

X: Because there is more employment in France than Algeria.

C: Apprenticeship contracts can only be made with people who have French or EU nationality, so you must study at school. I will give you a list of occupations, so please think carefully about what you want to do.

Moreover, counseling continues as the student goes back and forth between France and Algeria, with the counselor asking what the status of each occupation in his hometown is. Despite facing serious difficulties, student X is smiling all the time; to the observer (the author), it appears to be more a kind of surrender than a lack of sense of crisis.

Case 2-b: French high school student enrolled in motorcycle manufacturing course to obtain professional baccalauréat

He considers dropping out of high school and is prompted by school guidance counselor to visit the CGIC with his father and grandfather. He likes to learn about motorcycles, but he hates his school and cannot go there. He is not interested in car manufacturing, which is the adjacent occupational field; thus, the counselor looks for other high schools that have a motorcycle manufacturing course where he can obtain a professional aptitude certificate (PAC), which is at a lower level than the professional baccalauréat. However, no such school exists nearby. The counselor determines that it will be difficult for him to attend a distant school and proposes him to obtain a PAC while working with the help of LM, or to learn at an apprenticeship training center (ATC) via the Mission to Fight Dropout from School (MFDS) (Mission de Lutter contre le Décrocharge Scolaire), which is a reinstatement support agency. He chooses the latter, so the counselor writes a letter of introduction to the MFDS and gives the copy to him and his father. From the observer's point of view, the student's reaction during the counseling is weak, and he lacks sprit, but the father and grandfather have a stern look throughout the meeting.

Analysis of Case 2 (a and b) from three perspectives

(1) Recognition

The CGIC accepts students who do not have a place of belonging at school or have not yet made a decision about their education career, carefully listens to their opinions and continuously supports their self-determination.

(2) Culture

The counselors talk to immigrant youth by taking into consideration their language barrier and tries to connect the two cultures by helping them recall their experiences not only in France but also in their country of origin.

(3) Collaboration

The CGIC works with schools to reach out to at-risk youth and collaborates with various specialized agencies, such as ATC and MFDS, in problem-solving.

Discussion of results

We compare the survey results in France with those of Japan.

(1) Recognition

Regarding the RYSS, interest in "career decision," such as making various academic achievements and attending vocational training, which was emphasized at the time of establishment, gradually diminished. Especially after 2015, the connection to stable and continuous employment has been given greater importance (Oyamada, 2017). However, as already pointed out, the RYSS has become a resource to help young people with various difficulties realize their social independence as the staff have internalized a view of support that emphasizes the development of their autonomy (Oyamada, 2018). Therefore, although both the RYSS and the CGIC contribute to recognitive justice, they have something in common, in that this mission is not properly evaluated. It is then required to diversify the evaluation criteria and to introduce qualitative evaluation as well as a quantitative one.

(2) Culture

In the case of the CGIC, a glimpse of "culture-infused counseling" (Arthur & Collin, 2005) was identified. The counselors made their efforts to remove cultural and social barriers after acknowledging the cultural identity of migrants. On the other hand, the problem is that the client's language proficiency hinders "counseling based on constructionism" (Maree, 2013), which reveals their life themes and reconstructs their careers. In the RYSS, it is expected that more opportunities to support young people with foreign roots will be available in the future. It is necessary to balance consideration for ethnic identity and cultural adaptation in counseling and to provide linguistic support.

(3) Collaboration

France is far more advanced than Japan in developing career support networks. Regarding cooperation with high schools, especially, only 10% of them cooperate with the RYSS in Japan (Kojima, 2012). Certainly, CGIC can cooperate with schools smoothly because, contrary to the RYSS, they are not a nonprofit organization; however, public institutions and intervention in schools are systematized. At the same time, the counselors' career support for all students provides an opportunity for at-risk groups to visit the center. Kojima (2012) also points out that it is possible to reach out to the unemployed or to school dropouts by deepening the collaboration with high school step by step; for that purpose, RYSS must expand their role and be involved in career education in general and also meet the needs of high schools during work-style reforms.

Furthermore, issues remain concerning the lack of child and youth development support area councils. The main causes are the lack of administrative departments and specialized institutions for youth support as well as the difficulty in coordinating the division of roles between actors (Cabinet Office, 2015). In this regard, the government should establish a framework for collaboration at the national level (for example, LM do not directly interact with schools but cooperate with them via the CGIC in France,) assuming flexibility in each region. In addition, it is desirable to share common goals for reducing social disparities throughout the network, as with target contracts among CGIC, educational administration, and prefecture, and to take joint responsibility for social justice.

Conclusion and recommendations

In this paper, the RYSS in Japan was compared with the CGIC in France, and suggestions for advancing youth support for social justice were derived. RYSS contribute to recognitive justice, but their role has not been justified. They do not adequately respond to different cultures and collaborate with other institutions.

This study proposes four recommendations regarding the direction of the RYSS. The Japanese government needs to build a framework of cooperation between the RYSS and other actors and to develop qualitative evaluation indicators. Each RYSS should be involved in the overall career education for the promotion of outreach and should practice "culture-infused counseling" for immigrant youth.

Notes
1. IAEVG Communiqué on Social Justice in Educational and Career Guidance and Counselling, https://iaevg.com/Resources#Communiques

(2020.8.1.）

2. JSSCE 40th Anniversary Mission Statement, http://jssce.wdc-jp.com/about/mission/ (2020.8.1.）

3. The American Counseling Association cites "Community Collaboration" as one of the skills that counselors need to provide counseling for social justice (American Counseling Association: Advocacy Competencies, https://www.counseling.org/docs/default-source/competencies/aca-advocacy-competencies-up-dated-may-2020.pdf?sfvrsn=f410212c_4, (2020.8.1.）

4. For more information on the social roles of Local Mission and the practice of career counseling there, refer to Kyomen (2015b).

5. In each case, counselors, clients, and their families consented to this study, and ethical considerations were made when using the data.

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Curriculum of Vocational Education Doctorate Program for the Formation of Graduates Competency

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Abstract This study aims to find out: (1) the uniqueness of Vocational Education Doctorate Program curriculum, Postgraduate Program of Unesa, compared with similar Doctorate programs in Indonesia; and 2) the level of suitability of the Vocational Education Doctorate Program curriculum with graduate competencies. This type of research is descriptive quantitative and qualitative. The first aim was solved by analyzing the curriculum documents of Unesa Vocational Education Doctorate Program, UM Vocational Education Doctorate Program, and UNY Vocational and Technology Education Doctorate Program. Whereas the formulation of the second aim was carried out by distributing questionnaires and interviews with stakeholders, including LPTK lecturers, Polytechnic lecturers, teachers, and schools. Data were analyzed descriptively quantitative and qualitative. The results of the study showed that: 1) the characteristics of Vocational Education Doctorate Program are that graduates are expected to be able to develop vocational learning in vocational education in higher education, vocational education in vocational high schools, and education and training. Profile of Unesa's Vocational Education Doctorate Program of Unesa is "becoming an academic/scientist/educator/practitioner in various levels in the field of vocational education and/or science". The profile of Vocational Education Doctorate Program of UNY is "producing academics and practitioners". The profile of Vocational Education Doctorate Program of UM is "to be a creative and innovative human being in deepening, expanding and developing vocational education and responsive to the problems of vocational education at national and global scope with a multidisciplinary, interdisciplinary and transdisciplinary approach"; and 2) Most of the respondents (70%) thought that the Vocational Education Doctorate Program curriculum was in accordance with their needs. The rest, despite stating that the curriculum is in accordance with the needs, respondents gave input on the addition of graduate profiles, the addition of courses and studies, as well as the use of more varied learning media.

Keywords Curriculum, Doctorate Program Competencies, Vocational Education

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Talent Development through Assessment of Technical Education in Malaysian Secondary Schools

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Abstract Talent development need to be taken into account in evaluating technical education programs. In the era of the industry revolution 4.0 new shifts in the assessment of technical education programs were innovations towards universal education sustainability. The technical subjects comprised of Fundamental of Sustainability (AK), Technical Communication Graph (GKT) and Invention (RC) has been introduced as elective subjects for Form 4 and Form 5 students in Malaysian Secondary School. Based on empirical studies on implementation of technical subjects in Malaysian secondary schools, the key issues are limited teacher knowledge and skills, poor administrative role and lack of staff training. Data from the Ministry of Education also show a decline in students' enrolment in AK, GKT and RC between 10 to 17 percent yearly. Hence, this study was conducted to evaluate on the implementation of AK, GKT and RC in the input, process and product dimensions. A CIPP model was used as a conceptual framework for the study. Research design used in this study was programs evaluation. Stratified random sampling was used to select 335 respondents from national secondary schools in Peninsular Malaysia consisted of 159 administrators and 176 teachers. Questionnaires, interview protocols and observation checklists were used as instruments in this study. Cronbach Alpha reliability index for the three sets of questionnaires were between 0.77 to 0.93. Descriptive and inferential statistics were used to analyze the data. The empirical data of the study found that Innovative technical education assessments should take into account is the knowledge and skills of teachers, staff training and role of administrators. Interview and observation data were also presented to support the quantitative findings. Implications and recommendations for teaching and learning as well as for future research are presented and discussed.

Keywords Technical education, Talent development, CIPP model, national schools, Malaysia

A Model of Vocational Education Curriculum Development to Improve Graduates Personal Capabilities in The Magister Program

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Abstract Graduates of the Magister Program in Vocational Education have an important role in improving the quality of vocational education and training in a country at various levels of education. In order to prepare graduates to become people who are able to adapt to the work environment in developing their workplace institutions based on their areas of expertise and potential work areas, the Magister Study Program of Vocational Education, Universitas Negeri Malang has made efforts to develop its curriculum according to the demands of its stakeholders. The purpose of this study was to develop a curriculum model for the vocational education study program based on enhancing the capabilities of graduates. The hope is that they will be able to have a professional career in their workplace in supporting the improvement of the quality of their institution later.

This research was conducted with a qualitative approach with descriptive methods. The stages of this research consisted of five steps. First, researchers conducted an empirical study through visits to vocational education magister study programs in the country (Yogyakarta State University and the Universitas Pendidikan Indonesia) and abroad (National Yunlin University of Science and Technology and National Taiwan Normal University, Taiwan). Second, researchers attended a curriculum development workshop conducted by the Teaching and Education Development Institute at the university level. Third, the researcher held a meeting with stakeholders and alumni from the vocational education magister study program, Universitas Negeri Malang. Those were representatives of private and state industries, provincial and district education offices, vocational high schools, polytechnics, training centers, and excellent alumni. The fourth step was designing a new curriculum for the magister program of vocational education. The development of curriculum design is oriented towards increasing the capability of graduates to work after graduation. The last step was to finalize the concept of a curriculum development model that has been developed by researchers and the curriculum development team of the vocational education magister study program, Universitas Negeri Malang. This was done through a Focus Group Discussion which discusses the content, process, and theoretical basis.

All data obtained from this phase was added with documentation data then analyzed descriptively to describe the findings of this study. The development of a curriculum model for the vocational education magister study program was carried out from May 2019 to August 2020 at Universitas Negeri Malang.

Eventually, the development of a curriculum based on improving personal capabilities for graduates was designed based on the concept of Dynamic Capabilities and T-Shaped Knowledge (Saviano & Barile, 2013). This concept is the strengthening of basic theories about the management and development of vocational education that is carried out for 2 semesters. Next, strengthening capabilities dynamic students was conducted in accordance with their fields through a vocational education development project program and a student internship. This will be carried out for 2 semesters. Both of them will be done in institutions of vocational education and training in their respective regions. All activities will be programmed through a collaborative program carried out by the study program team.

Keywords Curriculum Development;,Vocational Education, Personal Capabilities, Territory Potency

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Research on the Connotations and Elements of Digitalization of Vocational Education in Post-epidemic Era

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Abstract In response to the COVID-19 in 2020, an unprecedented scale of online education practice has been launched worldwide. At present, with the control and prevention entering into a regular stage, how to promote the further development of digital education in the post-epidemic Era is the main concerns of the whole society. Under the guidance of the digital technology, including 5G, cloud computing, big data, artificial intelligence and blockchains, countries around the world have taken digitalization as an opportunity

and launched the National Digital Education Development Strategy. The China's Ministry of Education has issued a series of strategies, such as Plan of Action for Education Informatization 2.0, China's Educational Modernization in 2035, Plan of Action for China's Digital Education in 2020, and has actively promoted "the Internet Plus Vocational Education". Using Internet thoughts and methods, an integration between modern information technologies and vocational education is the new trend.

Digitalization in vocational education is the foundation of building a modern vocational education system. At present, the establishment of China's digital vocational education is still in the primary stage, and there should be a clear concept of digitalization in vocational education. In the process from informalized education to digital education, according to its definition and utilization, it pays more attention on information collection, processing and transmission, through the continuous improvement of the ways of information processing, it improves productivity and production efficiency. Digitization is the continuation of basis of information technology, which generated based on the results of information technology, and it more emphasizes on virtualization, which also called "Digital Twins", that is, through the simulation of human society by digital technology, the physical world could be digitalized. In terms of engineering, the stage of information pays more attention to the "realization", while the stage of digitization should pay more attention to "reality", which is the deeper integration of science and technology and society. The purpose of digitalization in vocational education is to deal with problems in vocational education and make it valuable, which is an effective procedure to introduce digital technologies and make improvements. What's more, it emphasis on innovation, intelligence and learning process of self-responsibility, self-reflection and self-control.

The digitization of vocational education consists of many elements. First, digital education concept. Focus on student's needs, and use digital technology to focus on student's needs. Digitization can effectively lead to organized and continuous learning and communication between teachers and students. Second, digital training objectives. The goal is to construct a professional setting mechanism which needs talents, professional qualifications and abilities in the future digital work, to set up new specialties suitable for the development of new industries, new technologies and new forms of business, and to formulate clear talent training goals. Third, digital curriculum. With the integration of digital technology in curriculum, it is beneficial to construct the systematic work process curriculum system which can be integrated into the working process of digital media effectively. Fourth, digital teaching. Teachers should be trained in digital education, and put digital technologies into teaching practice. And construct the quality assessment mechanism of talent training, and explores the establishment of intelligent and operable digital evaluation method. Fifth, digital education resources. With students learning needs at its core, the aim is to establish an efficient digital learning resource platform and highlight the central position of students in the learning process. Sixth, digital education management. Add new digital teaching facilities, display and interactive equipment for teachers and students, to realize data management, intelligent management, teacher-student interaction, optimization of process and service transformation, so as to improve the operation efficiency of internal management.

Keywords digitization, vocational education, educational informatization, Post-epidemic Era

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How Family Background Influences High School Students' Occupational Expectations in China - An Empirical Study Based on Shanghai and Jiangxi

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Abstract Based on the international and domestic research, family background has an impact on individual development. On the basis of Wisconsin model, this paper explores the way socio-economic status affects the occupational expectations in different regions in China. The paper reveals the following findings. (1) Family socio-economic status is closely related to occupational expectations in high school (2) Cultural capital compared with others has more significant impacts; (3) Regional differences, the most prominent impact exists among suburban areas in first-tier city (4) Students who are born in high family socioeconomic status tend to determine their career expectations before determining educational expectations, and the lower ones are opposite; (5) Mother's education level and professional status play an important role in the job expectation of the next generation.

Keywords occupational expectation, family socioeconomic status, education and occupation

Brand New Mission of VET: Practical and Theoretical Considerations for Training Older Workers

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Abstract Rapid aging population and decreased fertility rate will lead to a future labor shortage, which has become a severe problem is some super-aged countries like Japan. The younger generations will not be able to fill the void in the future (Gatchel et al. 2018). Previous studies show that the matured and older workers (aged 55 and older) are a valuable human resource in today's labor market, and they will hold the key to change (Wright, 2006; Crawford et al., 2016; Collins & Casey, 2017). The labor force participation for the group aged 55 and over has increased sharply in many countries. It is estimated that one in four US workers will be 55 or over in 2026 (Collins & Casey, 2017). In Canada, older workers aged 55 and over increased from 10% in 2001 to 17% in 2009 and to 20.7% in 2016 (Statistics Canada, 2016). Besides the USA and Canada, Japan is expected to have the largest proportion of old people in the world. In Japan, the population aged 65 and over has reached to 27% in 2019 and is expected to rise to 35% in 2050. Continuing to work after retirement has become very common among Japanese elders. Labor force participation for the group of aged 60-64 was 68.8%, aged 65-69 46.6%, aged 70-74 30.2% and aged 75 and over 9.8% in 2019 (Japan Statistics Bureau, 2019).Due to mistaken beliefs that older workers could not work effectively and productively, many of them, whether 45, 60 or 70, suffered unfair treatment and prejudices in their workplace, such as denying their promotions and excluding them from training opportunities.

To keep a diverse workforce motivated and adapt to the changing workplace with continued reliance on computer-based technologies, both younger and older workers need to participate in training programs. This is particularly true for older workers who are less possible to master essential technology skills needed in today's workplace. In the current study, older workers not only refer to those who might not retire yet, but also those who have retired already, but continue to work beyond retirement age out of various personal or economic reasons.

One of the negative labels is that due to the unavoidable physical and cognitive changes with aging, older workers would not be able to learn new skills, especially to keep up with the fast pace of advanced technologies. Many employers may exclude older workers from training opportunities, because they think that it is not the best investment, the older workers will retire soon. It is time to set aside these stereotypes and negative attitudes. How to help employers, managers and supervisors overcome common misperceptions about older workers' capabilities? What are the factors influencing older workers' participation in training programs? To meet the training needs in aging workforce, how VET sector fulfills its brand-new mission by extending its traditional scope to provide skills training for older workers?

Keywords new mission of VET, older workers' training, practical and theoretical considerations

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A Study on the Development of Evaluation Criteria for Invention Education Program

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Abstract Although the invention education in Korea has been rapidly expanded and grown under the supervision of government and related institutes. However, the effective and efficient operation and management for the invention education with systematic evaluation criteria is still unsatisfactory condition. Another one is that it is very difficult to find reliable evaluation criteria for the programs and management of the invention education in nationwide.

Under this recognition this study has been performed for resolving the unsatisfactory condition. So the purpose of this study is to increase the effectiveness and efficiency of invention education by presenting basic evaluation criteria that can be used when designing and preparing invention education programs in various educational institutions that operate invention education. The results of this study are as follows.

First, the stages of the Invention Education Program were named as '4P stages' which consist of 4 stages of Planning, Preparation, Process, and Product.

Second, the areas of evaluation for the Planning stage of the invention education program are comprised of goal setting, demand analysis, and curriculum design. The areas of evaluation for Preparatory stage are comprised of developing an invention education program, securing human resources, securing material resources. the evaluation areas of the Process stage are comprised of program operation, program management, and learner management. The evaluation areas of the Product stage consist of education performance, achievement results, and education evaluation'.

Invention education program evaluation criteria will play an important role to enhance and manage the quality of invention education program.

In addition, it is judged that this will be the basic data for developing evaluation criteria for the invention education program through the reconciliation process through reflux and the validation process of related experts at various invention education institutions.

Keywords Invention Education, Program Evaluation, Evaluation Criteria

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A Study on the Characteristics of 3rd Grade Middle School Teachers in Charge Affecting their Students' Decision to Enter Vocational High School in Korea

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Abstract During the period of rapid industrial growth, specialized high schools were important vocational education institutions which have produced trained specialists and technicians in Korea. But now, specialized high schools in Korea turned into high schools where the students, who are low in academic performance and on its account are pushed out of the competition for admission due to the declination in the education population, the changes in labor demand in the labor market, and the discrimination against skilled workers, enter into.

In order to solve this problem, the middle school 3rd grade teachers in charge of the middle school can provide early career guidance, so that they can decide to go to the specialized high school according to their aptitude and talent rather than their grades.

The purpose of this study is to investigate the relationship between general characteristics and perception of middle school 3rd grade teachers, and the rate of decision to enter specialized high school. In 2018, The middle school 3rd grade teachers in charge in Daejeon metropolitan city were selected.

The results of this study were as follows: When 3rd grade teachers in charge are the male teachers, 21.01%(M=.2101) of their students go to specialized high schools. When they are teachers who have not graduated from college of education, the rate is 21.10%(M=.2110), in the case the teachers with doctoral degree the rate is 30.64%(M=0.3064), of their students go to specialized high schools.

Finally, it is turned out that when both the degree of the teachers' understanding specific departments in specialized high school($\beta1$) and their positive perception for getting a job right after high school graduate($\beta2$) are higher, they affect the students' decision to enter specialized high school(y) with more positive. The regression equation (around 10% of explanation for the y) derived from this is y = -0.56 + 0.037 * $\beta1$ + 0.025 * $\beta2$ 10.1% ($R^2 = 0.101$). For the independent $\beta1$ equation and $\beta2$ equation, the $\beta1$ was 0.245 and $\beta2$ was 0.149. But each independent equation does not have enough explanation power compare to the regression equation with adoption of both variables.

There was a significant positive relationship between perceptions of high school teachers ($\beta1 = .245$, p = .000) and high school graduates ($\beta2 = .149$, p = .027). The regression equation derived from this is y = -0.56 + 0.037 * $\beta1$ + 0.025 * $\beta2$ 10.1% ($R^2 = 0.101$).

Keywords Specialized high school, teacher in charge, advance decision, career guidance

A Case Study on the Actual Conditions of the Curriculum in Japanese Lower Secondary School: Technology and Home Economics

Tsuyoshi Maruyama

Abstract This study is a case study on the actual conditions of the curriculum in Technology and Home Economics, which is the subject that guides Japanese vocational education and training. Japanese Technology and Home economics is a subject for technical and vocational education and training as general education. In this study, the characteristics of the curriculum under the revised course of study for lower secondary schools in 2008 were clarified in T prefecture, and compared with the survey results under the 1998 revisions in the prefectures. The purpose is to clarify the changes. As a survey, we sent a questionnaire to Technology teachers of Lower Secondary School in T prefecture.

As a result of the research, we pointed out that the curriculum tends to be manufactured of daily necessities in the first and second grades and computer learning by PC in the third grade. Since the 1998 revised edition, computer education, which cannot be regarded as vocational education, has been taught even in the first and second grades. Under the 2008 revised edition, elective subjects are no longer being implemented and students have less opportunity to receive vocational education and training guidance. The ratio of teachers who have a teacher's license in the subject of Technology is also decreasing, and the learning environment for students is deteriorating. It is considered that the downsizing of Lower Secondary Schools has accelerated this tendency in Japan.

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