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An Examination of Taiwan's Junior College Adjusting Policy: From the Perspective of Labor Market Performance

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ABSTRACT The policy of upgrading technical education system has caused the decrease of junior colleges. But such policy is not quite justified due to a lack of serious empirical studies. This research attempts to show this fact by means of comparative analysis of the salaries of the salaries of the graduates of vocational high school, junior college, and university, found in the Directorate-General of Budget, Accounting, and Statistics. Followings are findings: (1) Graduates of junior college earn more than the graduates of vocational high schools between 15.8-20.1%; (2) The graduates of junior colleges' salaries are lower than those of universities between 15.5-21.0%; (3) The difference is not weakened by the effective of the background variables (age, gender, and marriage, etc.). Similar result shows the same trend. That means, the collected data point out the failure of the policy of adjustment that tries to cut realize a fair pay for graduates of vocation school, junior college and university programs. For the reason, it is suggested that the government should reconsider its policy in favor of junior college.

KEY WORDS Educational Policy, Job Market, Junior College

Introduction

In the 1990s, an oversupply in the number of junior college graduates and a lack of technical colleges resulted in junior college graduates being transferred to universities. In view of this phenomenon, the authorities took two major steps: reform blue-chip junior colleges as affiliated junior college divisions to various technical colleges, and promote a two-year technical study course in continued education. In 1996, the Ministry of Education announced "Implementation Measures for the Selection of Junior Colleges for Reform as Colleges of Technology and the Approval of Junior College Divisions," and in 1997, the restriction of six approved schools per year was removed. As a result, many junior colleges applied for reform and in less than five years, the number of junior

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colleges reduced from the original seventy to thirty-six (Department of Statistics, Ministry of Education, 2008) at the end of 1999. This was the first wave of contraction.

Post 2000 education policy basically continued the educational reform policy of the 1990s in refining and diversifying junior college. Since 2002, technological universities and technical colleges were allowed to establish graduate schools by the Ministry of Education. And the Ministry of Education stipulated that technological universities and technical colleges after establishing graduate schools wouldn't manage junior college divisions. There are many technological universities and technical colleges rather set up the graduate schools not to willing to conduct junior college divisions.

So large number of students into university of science and technology as well as college of technology, while the two-year college system that bridged with the junior college system was replaced by the four-year college system. The number of junior colleges decreased from 36 in 1999 academic year to the present 15, with the number of students dropped from 457,020 to 117,653 (Department of Statistics, Ministry of Education, 2008). In less than ten years, the total number of junior colleges had declined sharply by twenty one, while the number of students had reduced by over three hundred thousand. This was the second wave of contraction.

Whether from the consideration of economic manpower forecast or source of school enrollment, both afore-mentioned junior college contraction policies lacked proof relevant empirical study to show that the performance of junior college graduates in labor job market had been worsening (Wang, 2001). As a result such schooling system needed to be reduced in scale or completely abolished. For this reason, this study had identified vocational high school and university graduates as the reference subjects and looked to explore the performance labor with junior college qualification in the market through secondary data analysis. The research data used came from "Manpower Utilization Survey by Department of Statistics" between 1996 and 2007 (Manpower Incorporated, 1996-2007), in which labor force with vocational high school, junior college and university education qualifications were selected as the research subjects. The aim was to understand the differences in job performance and income between junior college graduates and graduates of vocational high school and university. These were the unanswered questions in the study:

1. Compared to vocational high school graduates, is there a salary difference with junior college graduates? If so, is the difference affected by age, gender, marital status, and other background variables? How does the difference between these two types of graduates in the job market vary in the long run? On a whole, do variables such as age, gender, and marital status have significant influence on how the salary differences are interpreted?

2. Compared to university graduates, is there a salary difference with junior college graduates? If so, is the difference affected by age, gender, marital status, and other background variables? How does the difference between these two types of graduates in the job market vary in the long run? On a whole, do variables such as age, gender, and marital status have significant influence on how the salary differences are interpreted?

So far very few papers written on the subject of junior college graduates'

performance in the labor market in Taiwan are available, and little is known about junior college graduates' long-term performance in the job market. Therefore, this article begins by analyzing the manpower utilization survey reports of the past twelve years from the department of statistics, Executive Yuan. By studying the trends of past graduates' long-term performance in the job market, this study looks to answer whether the government's policies of drastically reducing the scale of junior college schooling system are supported by empirical data.

Source of Data, Study Structure and Regression Model

This section will first explain how the empirical data was obtained in this study and its content, then construct the analytical framework and the statistical model that form that the empirical basis for this article.

Source of Data and Study Structure

The comparative workforce indicators and data of vocational high school, junior college and university graduates used in this article was derived from the salary information and relevant background variables (Directorate-general of budget, accounting and statistics, 2007) of "Manpower Utilization Survey Report in Taiwan". This survey report is prepared and compiled by Directorate-general of Budget, Accounting and Statistics of the Executive Yuan after site investigation in every year.

The sampling matrix was based on "Year-end statistical data files of household registration in Taiwan" of that year, where the entire Taiwan area was subdivided into twenty three sub-sections including Taiwan Province, Taipei City and Kaohsiung City, and all citizens of Taiwan of 15 years-old and above who freely engaged in economic activities were included. The sampling design used was "stratified two-stage random sampling method," with "villages" as sample unit for the first stage and "households" for the second stage. Take 2006 as an example, 520 sample villages were first selected from the 7,749 villages in the Taiwan area, and then 20,300 sample households were selected from each village.

The data collected by surveying departments was processed primarily by computers supported by manual sorting, which involved mainly the numbering, checking, amending, and analysis of survey forms; computers were used for data capturing, reviewing and publishing results, to ensure the entire data processing and checking process remained as stringent as possible (Directorate-general of Budgeting, Accounting and Statistics, 2006).

Figure 1 shows the framework of this study. The working definition of "Vocational education level" is as the population with education qualifications of vocational high school or junior college. "Job performance" measure is the salary level; "Salary level" is derived from answers to the question "what is your income from your primary job?" on DGBAS survey questionnaire asked about paid labors, and income types include salary, bonus, commission, overtime pay, tips, etc, but exclude childbirth and education

subsidies and other irregular incomes. For stable job-holders the most recent monthly income is used. For seasonal labors, an average monthly income is used.

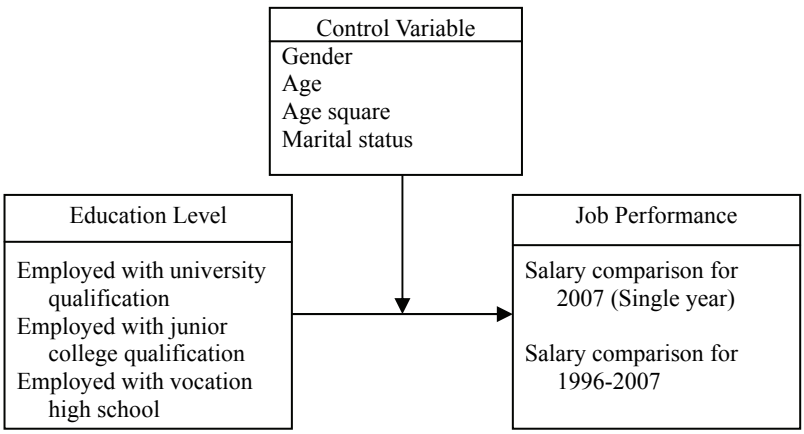

Figure 1. Study Structure Diagram

Regression Model and Variables

This article has used the following regression models as a statistical test tools: limited model Y_i =1996~2007 = f（Edu1, Edu2）; full model Y_i =1996~2007 = f（Edu1, Edu2, Gender, Age, Age2, Marriage.）Where Y_i =1996~2007 represents the salary income of the interviewees. Taking into account that salary values are far larger than other observed variables, this article has used natural logarithm to derive at salary variables, a method that is consistent with other domestic and international empirical studies (Kennedy, 1992; Gee, 1990) on the relationship between salary and age; "Edu" represents sample qualification, which is further divided into three levels of "vocational high school", "junior college" and "university" to form two virtual variables (with junior college qualification as common base for comparison). The first virtual variable is "Edu1" that presents "vocational high school vs. junior college", and the other virtual variable is "Edu2" that stands for "university vs. junior college"; in "gender", "male" is coded as 1 and "women" as 0; "age" is an observed variable; "age2" stands as the square value of interviewee's age and is a variable. "Marriage" refers to interviewee's marital status, with 1 as "married" and 0 as "others" (includes single, divorced, separated, or widow).

Sample Data Analysis

Interviewee Background Distribution

From the salary information and relevant background variables of the sampling matrix "Manpower Utilization Survey Report in Taiwan 2007," workforce with qualification in vocational high school, junior college and university were selected as samples, totaling 16,107 people. The "average salary" shown in Table 1 was calculated using SPSS software according to various background variables. In Table 1 that shows the basic information distribution, the largest workforce is found among the vocational high school graduates, while junior college and university have similar numbers. For average salary, university graduates are the highest and vocational high school graduates the lowest. In terms of gender, male has a larger workforce and higher average salary than female. In age, the group of 30-39 ages has the highest number of people of about one-third of total workforce, followed by the group of 20-29 ages, and the group of 40-49 ages. People of 50 years of age and above makes up only 12.2% of the population, with the group of 50-59 ages having the highest average salary, but the figure is slight low for the group of 60-69 ages. In marital status, although 57.2% of the workforces are married, the figure for others such as single, divorced, separated, and widowed is high at 42.8%. The average salary of these two types of workforces is higher than the former, and the difference is about NTD 11,478.

Table 1
Sample Background Analysis

Variable		Population	Percentage	Avg. salary (NTD)
Education level	Vocational high school	7,069	43.9	32791.88
	Junior college	4,251	26.4	38617.63
	University	4,787	29.7	44197.30
Gender	Male	9,019	56.0	42524.94
	Female	7,088	44.0	31604.03
Age	Over 15 and under 19	84	0.5	19185.71
	Over 20 and under 29	4,502	28.0	28830.23
	Over 30 and under 39	5,464	33.9	36503.78
	Over 40 and under 49	4,089	25.4	43196.93
	Over 50 and under 59	1,760	10.9	50892.94
	Over 60 and under 69	189	1.2	50765.09
	Over 70	19	0.1	46394.74
Marital status	Married	9,215	57.2	42630.69
	Others	6,892	42.8	31152.07

Note. NTD is Taiwan Dallor.

Co-linearity Analysis

This article has used "tolerance" to examine the co-linearity of specific independent variables with formulae as $1-R_i^2$, R_i^2 is the explainable ratio for the independent variable when such independent variable has been used as a dependent variable for forecast by other independent variables. Tolerance is the residual ratio when such independent variable can not be explained by other independent variables. The smaller the tolerance value, the higher the co-linearity.

In addition, this article has also used "Conditional Index (CI)" to evaluate the overall co-linearity of regression model. Conditional index is calculated by dividing the largest Eigen value by the square of the i'th Eigen value. The higher conditional index means the higher co-linearity of regression model. When CI value is below 30, it indicates moderate co-linearity, and between 30 and 100 indicates moderate to high co-linearity of the regression model. Above 100 means high degree of co-linearity (Chiu, 2002). From Table 2 one can see that in Model 1, the tolerance value is 0.67 for both vocational high school virtual variable and university virtual variable, with maximum condition value of 3.62 for regression model. One can then derive that there is no visible co-linearity in Model 1. As to Model 2, all independent variables' tolerance values are above 0.66 with maximum condition value of 12.30 for regression model. Therefore there is also no visible co-linearity in Model 2.

Table 2
Co-linearity Analysis Index

Variables	Model 1		Model 2	
	Tolerance	Max condition value	Tolerance	Max condition value
Education level virtual variable		3.62		12.30
Vocational high school	0.67		0.67	
University	0.67		0.66	
Gender virtual variable				
Male			0.96	
Age			0.70	
Marital status			0.71	

Regression Analysis Results on Salary Received

Regression Analysis Results for Year 2007

In order to compare the regression results between restricted model and full model, this paper has used the salary information and relevant background variables of sampling matrix "Manpower Utilization Survey Report of Taiwan" and selected three types of workforce, namely vocational high school, junior college and university graduates, as

samples. Only the 2007 data was analyzed using regression method. The results are shown in Table 3.

The regression results of Model One shown in Table 3 shows that the salaries of junior college graduates are higher than vocational high school graduates by 16.5%, but lower by nearly 11% when compared with university graduates (b = 0.107). These differences have all reached .001 in significant level.

As the background variables of respondents were not controlled in the forecast analysis of model one, in order to further understand if regression coefficient significance of education level variable will be changed with the addition of respondent background variables, gender, age and marital status were added as control variables in he regression model and model one was named "restricted model". After control variables were added, a robustness test was conducted on b value of education level variable regression and its significance (Levine & Renelt, 1992; Lyau, 2002).

Model 2 regression results show that after control variables such as gender, age, and marital status were added to afore-mentioned restricted regression results, the full model regression reached a significant level, indicating significant co-linearity relationship between salary and four independent variables did exist, which also explained the change from 5.7% to 23.3%. Furthermore, the relevant empirical studies have shown (Barron, Black & Loewenstein, 1987; Lyau, 1994) age (or length of service) did not often have a linear impact on salary, but curvilinear. In order to further confirm whether age has such an increasing or decreasing effect on salary, age squared variable was added into model 3.

Model 3 regression results showed that, after adding age squared, it not only explained the slight variance (1%) increase, the age regression coefficient also increased from 0.011 to 0.044 (t = 17.79). The age squared regression coefficient was relatively small and negative (-0.0004), with 0.001 significant level (t = -13.58). In other words, in terms of the study samples, as age of the samples increases, the salary will grow at about 4.4% per year, except such growth trend showed a gradual reduction, with average salary peaked around 50-59 age group workforce.

In addition, after the background variables of gender, age and marital status and two education variables were added into regression model two or three, its size and significant level of regression coefficient was not only unaffected, but increased slightly, which significance level kept at p <.001. The results showed that the two virtual variables (vocational high school vs. junior college, universities vs. junior college) of educational level had a rather strong influence on the degree and significance of salary variation, and its predictability was not weakened by the inclusion of other three background variables. In order to verify if four newly added variables in model 3 will result in a significant increase in overall wage variance, this article has used the formula proposed by Hinkle and Oliver for testing. The formula is as follows:

$$F = \frac{R^2\text{full} - R^2\text{restricted} / (f\text{-}r)}{(1 - R^2\text{full}) / (N\text{-}f)}$$

The 'f' represents the number of variables for 'full model', 'r' stands for the number of variables for 'restricted model', and 'N' is the sum of all models' regression and residual freedom.

Based on the foregoing formula proposed by Hinkle and Oliver in 1986, F = 4837.73, reaching a significant level of 0.001, and this result showed that gender, age, marital status and other background variables as a whole, have a significant impact on salary variation level and should not be ignored.

Table 3
Regression Table on 2007 Data

Variables	Model 1		Model 2		Model 3	
	Regression coefficient	**Std error**	**Regression coefficient**	**Std error**	**Regression coefficient**	**Std error**
Vocational high school (vs. Junior college)	-0.165***	0.009	-0.184***	0.008	-0.180***	0.008
University (vs. Junior college)	0.107***	0.010	0.155***	0.009	0.160***	0.009
Gender (1：male, 0：female)			0.224***	0.007	0.224***	0.007
Age			0.011***	0.000	0.044***	0.002
Age square					0.000***	0.000
Marital status			0.138***	0.008	0.107***	0.008
Constant terms	10.463***	0.007	9.851***	0.015	9.241***	0.047
R	0.240		0.483		0.492	
R^2	0.057		0.233		0.242	
After adjustment R^2	0.057		0.233		0.242	
N	16,107		16,107		16,107	
Senior vocational (vs. Junior college)	0.00***		0.00***		0.00***	

Note. *** $p < .001$

Regression Analysis Results on Data from 1996 to 2007

The earlier section analyzed the effects different qualifications had on salaries based on 2007 data. In order to further understand the development trends in salary differences between 1996 and 2007, twelve year's worth of DGBAS data was added year by year into model 3 (full model) explained in Table 3 and analyzed. The regression results are shown in Table 4 and Table 5.

Table 4 and Table 5 show that the total explained salary differences for each year is between 24.5% and 18.9%. In other words, the models in this article can explain up to 1/4 of the total variance in the sample salary. If compared with other similar studies in foreign literature (Grubb, 1992; Neuman & Ziderman, 1989, 1991; Rouse, 1992), the

explained amount was already fairly high.

In terms of the vocational high school graduates' salary income in the past twelve years, it was significantly lower than junior college graduates as predicted, with a difference of between 15.8% and 20.1%. University graduates' salary income was found to be significantly higher than junior college graduates' at between 15.5% and 21%. In order to fully grasp this trend, the b values of these two variables for each year are presented in the scatter plot diagram as shown in Figure 2.

Table 4
Regression Analysis on Salary Forecast and Education Level (1996-2001)

Variables	Salaries					
	1996	**1997**	**1998**	**1999**	**2000**	**2001**
Vocational high school (vs. Junior college)	-0.168***	-0.158***	-0.182***	-0.181***	-0.167***	-0.176***
University (vs. Junior college)	0.179***	0.180***	0.189***	0.215***	0.206***	0.210***
Gender (1：male, 0：female)	0.244***	0.233***	0.221***	0.215***	0.220***	0.196***
Age	0.054***	0.052***	0.052***	0.051***	0.050***	0.048***
Age square	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***	-0.000***
Marital status	0.091***	0.073***	0.085***	0.090***	0.100***	0.095***
Constant terms	9.048***	9.119***	9.164***	9.166***	9.158***	9.184***
R	0.495	0.458	0.491	0.439	0.464	0.435
R^2	0.245	0.210	0.241	0.193	0.215	0.189
After adjustment R^2	0.245	0.210	0.241	0.193	0.215	0.189
N	13,479	13,605	14,249	14,201	14,609	14,741
Model significance	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***

Note. *** $p < .001$

Table 5
Regression Analysis on Salary Forecast and Education Level (2002-2007)

Variables	Salaries					
	2002	**2003**	**2004**	**2005**	**2006**	**2007**
Vocational high school (vs. Junior college)	-0.179***	-0.201***	-0.205***	-0.189***	-0.168***	-0.180***
University (vs. Junior college)	0.208***	0.210***	0.179***	0.149***	0.145***	0.160***
Gender (1：male, 0：female)	0.198***	0.196***	0.197***	0.207***	0.214***	0.224***
Age	0.057***	0.062***	0.055***	0.057***	0.062***	0.044***
Age square	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***
Marital status	0.092***	0.096***	0.085***	0.100 ***	0.114***	0.107***
Constant terms	9.019***	8.909***	9.046***	8.987***	8.879***	9.241***
R	0.471	0.434	0.454	0.484	0.458	0.492
R^2	0.222	0.189	0.206	0.234	0.210	0.242
After adjustment R^2	0.221	0.188	0.205	0.234	0.209	0.242
N	15,929	15,603	15,912	16,106	16,066	16,107
Model significance	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***

Note. *** $p < .001$

In Figure 2 the square points near the top represent yearly salary percentage difference between university graduates and junior college graduates (controlling other background variables), and the line above is the regression line based on these 12 points, its equation is $\hat{y} = -0.0034x + 0.208$; the diamond points below represent the salary difference scatter plot diagram between the workforce of vocational graduates and those of junior college graduates, with regression line equation of $\hat{y} = -0.0017x + 0.1628$. The slope of both lines are negative, with absolute value of the upper line larger than the line below, representing a reducing trend in salary gap in the job market between junior college and university graduates in the past 12 years, but a widening trend between junior college and vocational high school graduates. As the former's absolute slope value (0.0034) is twice that of the latter (0.0017), this means that the rate of reduction between junior college graduates and university graduates is higher than that of junior college graduates and vocational high school graduates. In other words, compared to

university graduates and vocational graduates, the workforce with junior college qualification has been improving steadily in the labor market for the past twelve years. By carefully controlling other variables, not only is the gap in salary income between workforce with junior college qualification and workforce with university qualification reducing, the gap between junior college graduates and vocational high school graduates is widening. The former is decreasing faster than the later.

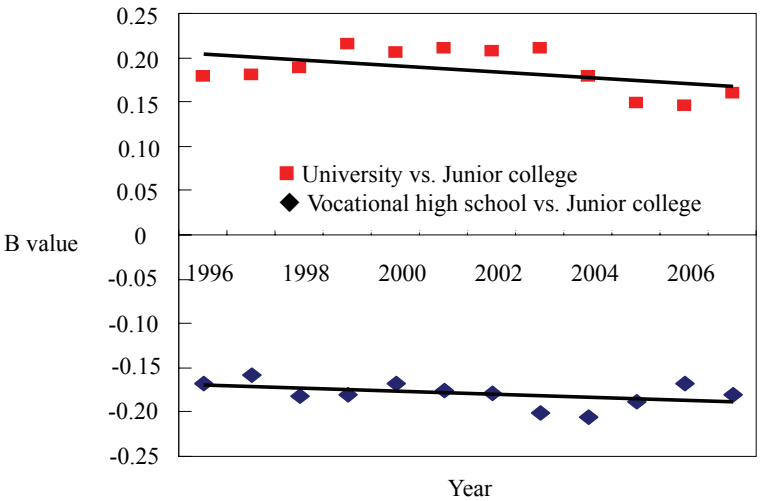

Figure 2. Regression Coefficients for Various Years

Conclusion and Recommendation

Between 1996 and 2007, the number of junior college and student has drastically reduced as a result of technical college upgrade and the reform of the two-year college schooling into a four-year college schooling (DGBAS, the Ministry of Education, 2008). Whether such policy change was based on the government's policy considerations of upgrading workforce quality, or cost considerations of reducing enrollment costs for schools, it lacked the relevant empirical basis for its direction. For this reason, this study has identified three types of workforce, namely vocational high school, junior college and university graduates, from "Manpower Utilization Survey by Department of Statistics" between 1996 and 2007, and conducted comparative analysis between their salary incomes and relevant background variables. Relevant conclusions and recommendations were derived through regression analysis as below:

Conclusion

(A) The total income of junior college graduates is significantly higher than vocational high school graduates by 15.8% to 20.1%, and such difference is not affected by background variables such as age, gender, marital status, and others.

(B) A pull-away trend is observed for the long-term difference in the job market between above-mentioned two groups of workforces. Although background variables such as age, gender, marital status, and others of vocational high school and junior college graduates do not interfere with the magnitude and extent of the impact their qualification variable have on salaries, under the overall model, can significantly increase the amount of wage variance explained.

(C) The total income of junior college graduates is significantly lower than university graduates by 15.5% to 21%, and such difference is not affected by background variables such as age, gender, marital status, and others.

(D) A closing trend is observed for the long-term total income difference in the job market between junior college and university graduates.

(E) Although background variables such as age, gender, marital status, and others of the two types of graduates mentioned earlier do not interfere with the magnitude and extent of the impact their qualification variable have on salaries, but it can significantly increase the amount of wage variance explained.

Recommendation

A country's economic development requires different skill levels of human resources, and technical and vocational education no matter of the level of education such as has played a vital role in Taiwan's economic development, whether it is vocational high school, junior colleges, or technical college graduates. It is the aim of this article that by presenting empirical results analyzed from junior college graduates' job performance data between 1996 to 2007, multi-dimensional research data will be used as the benchmark when considering junior college policy adjustment in the future. Specific recommendations from the angle of academic research, industry needs and students' career needs are offered by this study as below:

(A) Specialist academic adjustments should have based on the results of empirical research: in fact, any education policy changes will be more convincing if they are grounded on empirical research results. This study conducted analysis by looking at junior college graduates' performance in the job market, and research results did not support current adjustments. It is the hope of this study that more multi-faceted (different angle, data, and analytical method) empirical studies will be conducted to justify the legitimacy of junior college adjustment policies.

(B) True assessment of the talents demand structure for industry: Any economic entity or country will always have a demand for different levels of workforce regardless of its degree of industrialization. Whether the drastic reduction in the scale of junior college schooling system will cause middle-level workforce shortages in the future continues to worry many. Therefore any policy adjustment shall be based on future

industry development and a true assessment of the demand for junior college workforce.

(C) The education planning and career choice of high school and college graduates must be emphasized: whether it's a two-year or five-year college, it is still an important education choice for junior high school or vocational high school graduates. Some of the students and parents may have chosen junior college from an investment return point of view. Perhaps meeting the needs of these students and parents can become an area of consideration for policy adjustment.

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A Policy Program to Build the Specialized Vocational High Schools Funded by the Governmental Ministries that Demands for the Workforce in Korea

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ABSTRACT The purpose of this paper was to introduce and review the policy program which has helped build the specialized vocational high schools funded by governmental ministries in Korea. Introduced by the previous Ministry of Education and Human Resource Development (MEHRD), the program is a five-year plan that allows any governmental ministry and office to directly support vocational high schools for their specialization to produce the core workforce on demand of their interested industries. The program offers three management models for building the specialized vocational high schools: Total consignment management model (Model I), Co-management model (Model II), Supporting program model (Model III). In 2007, the five ministries selected a total of 106 vocational high schools for the program. To ascertain that the policy program successfully proceeds, the ministries and MEHRD came to a consensus, signed the memorandum of understandings (MOUs), and have managed and funded the specialized schools since 2008. The annual reports on the program showed that it works successfully; however, there were some issues: lack of active interaction among the involved governmental ministries, the provincial offices of education, and the vocational high schools. For the better implementation of the program, 33 strategic tasks were identified. In addition, this policy could be a benchmark for other Asian countries to support their vocational high schools.

KEY WORDS Specialized Vocational High Schools, Governmental Ministries, Policy Program, Korea

Introduction

Korea has a school system of the 6-3-3-4 singular track, providing six years of primary education, three years of middle school, three years of high school, four years of university - including two or three years in junior college; and the vocational high

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schools provides the most of vocational education at the secondary education level in Korea. The vocational high school aims at providing general education as well as vocational education in the field of agriculture, industry, commercial, fisheries-marine, home economics, and others.

The vocational high schools in Korea contributed in raising human resources for economic growth in the 1970s and 1980s. However, today, the high schools have been criticized that they cannot properly cultivate the people to the recent environmental changes, informational expansion, and technological acceleration (Na, Chang, Jo & Song, 2007). Moreover, 'skill mismatch' problems weakened Korea's competiveness between the trained people in vocational high schools and the required people in companies and require the industries to retrain people, costing time and money (Presidential Committee of Educational Reform, 2005).

Along with the crisis of the vocational high schools, the ratio of vocational high schools to all high schools in Korea has constantly declined since 1980s. The ratio in 1970 was 54.1% (481 schools), but those in 1980 and 1990 were 44.7% (605 schools) and 34.9% (587 schools), respectively. At present, the ratio has decreased down to 31.8% (697 schools). Today, there are 209 technical high schools (30.0%), 193 commercial high schools (27.7%), 191 comprehensive high schools (27.4%), 69 home economics and vocational high schools (9.9%), 28 agricultural high schools (4.0%), and 7 fisheries and marine high schools (1.0%).

Table 1
The Number of Vocational High Schools by School Types

Total High School (A)	**Vocational High Schools(VHS)**							**Ratio of VHS (B/A)**
	Total VHS(B)	**Agricul-tural**	**Technical**	**Commer-cial**	**Fisheries/ Marine**	**Home economics /Vocational**	**Comprehen-sive**	
2,190	697 (100.0%)	28 (4.0%)	209 (30.0%)	193 (27.7%)	7 (1.0%)	69 (9.9%)	191 (27.4%)	31.8%

Source: Center for Education Statistics. (2008). 2008 Annual report of educational statistics.

To develop and reform the vocational high school, the Korean government has implemented various policies for the administrative and financial support such as 'Plan to Construct a New Vocational Education System (1996)', 'Five Years Plan for Education Development (1999)', 'Vocational High School Development Plan (2001)', 'Plan of Vocational Education System Innovation (2005)', 'Strategies for Fostering Vocational High Schools in order to Realize Hopes (2007)', and 'Plans to Cultivate the Korean Meister High School (2008).' In the process of implementing these policies, all specialized vocational high schools have been performing more effectively than the rest of other types of vocational high schools did (Song et al., 2008).

Due to the result, the Korean government executes the policies to increase the number of the specialized vocational high schools continuously. The specialized vocational high school educates the students having similar aptitude and interest in a

specialized area with a purpose of fostering talented workforce in its specialized area or a school specialized in experience-based education (Elementary and Secondary Education Act Enforcement Ordinance Article 91). In the future, the specialized vocational high school will be estimated about 300 schools as the government's direction to expand them (Ministry of Education and Human Resource Development, 2007). Representatively, the policy program to build the specialized vocational high schools by the Korean governmental ministries, the local governments, or the industries demanding the workforce has been implemented. Up to now, all the vocational high schools have been supervised by the provincial offices of education as well as the Ministry of Education and Human Resource Development. However, the new policy program is intended to diversify the supervisor of the vocational high schools including the governmental ministries, the local governments or the industries (Na, Chang, Jo & Song, 2007). Alternatively, the policy program is a solution to enhance the financial support for specialized vocational high school because the right of execution of the budget was transferred to the provincial offices of education from the Ministry of Education and Human Resource Development since 2005.

Especially, in April 2007, the 'Plan for Building Specialized Vocational High Schools by the Korean Governmental Ministries' was announced, and in May, the management programs for supporting specialized vocational high schools by the governmental ministries were developed by Seoul National University Research Team (Na et al., 2007). Based on the results of the research project, a prospectus was announced and in June 2007, and 106 schools connected with eight governmental ministries (five ministries in 2009) have been finally selected until February 2008. From October 2007 to March 2008, the Ministry of Education and Human Resource Development and the individual governmental ministry who take charge of the specialized vocational high school have contracted the MOUs. Then, the governmental ministries have given the financial and managerial support to 106 schools demanding the workforce and help them to be specialized since 2008.

However, the level of understanding program among the supporting ministries, provincial offices of education, and the vocational high schools varies greatly. Even though the cooperation and mutual communication is the key to success of the program, they followed not uniform, but different action guidelines and ways of handling affairs, resulting in a general confusion of the program. It is necessary to review the program for building the specialized vocational high schools by other governmental ministries except education. At the same time, it would be a benchmark for other Asian countries to support vocational high schools for their specialization.

Description of the Policy Program

Goals and Development Processes of the Policy Program

In April 2007, the previous Ministry of Education and Human Resource Development

(MEHRD) introduced the policy program to build the specialized vocational high schools by other governmental ministries to lower the avoidance of vocational education, to promote a smooth transition from high school to work, to induce other government's involvement and participation to support the vocational high schools, and to meet the needs of smoothing the polarization in education (Ministry of Education and Human Resource Development, 2007c). The policy program has two goals: one is to produce the core industrial workforce with both knowledge and practical competencies by the governmental ministries in their interested sectors; other is to build the specialized vocational high school by funding and supporting the vocational high schools for their specialization.

The origin of the program goes back to the Plan of Vocational Education System Innovation (Presidential Committee on Education Innovation, 2005) that was a concrete government commissioned execution plan. The goal was to enhance the vocational competencies throughout one's life by smoothly going back to work from school and vice versa. To that end, as for the tasks related to the secondary vocational education, the prestigious specialized vocational high schools directly related to the industrial demands are to be involved, strengthening basic vocational education in general vocational high schools and supporting school-based changes.

From September to December 2006, a meeting for budget confirmation and plan settlement by the heads of each ministry section has been held and was regularized in December after it was introduced to the 6th Human Resources Development meeting. In February 2007, Strategies for Fostering Vocational High Schools in order to Realize Hopes were announced as a new year's plan.

For the development of the policy program to build specialized vocational high schools by other governmental ministries except MEHRD, in May 2007, a research project was conducted under the direction of professor Na in Seoul National University, and a prospectus based on the report of the research was prepared and announced. Since June 2007, each ministry started to select the vocational high schools supporting for building the specialized high schools. During the period from October 2007 to March 2008, MOUs were contracted among the participating ministries, Ministry of Education and Human Resource Development, and the metropolitan or provincial offices of education. As a result, 106 schools have been selected and funded for building specialized vocational schools according to each ministry's direction since 2008.

Table 2
Development Processes of the Policy Program

Time	Main Contents
May 2005	Suggests the program for building specialized vocational high schools by the Korean governmental ministries as a plan of the vocational education system innovation
March 2006	Creates management plans for the Korean governmental ministries -Creates plans and readjusts the system so that the according ministry can execute actual responsive management.
August 2006	Suggests concrete executive plans for the management of the Korean governmental ministries - According ministry is commissioned with the school management so that vocational education track for specialized section is completed.
September-December 2006	Head Meeting(Vice Minister/Chief/Direction) between according sections about the management of the vocational high schools by Korean governmental ministries -Budget confirmation and plan settlement have been held
December 2006	Introduced the program to the sixth Human Resources Development meeting
February 2007	Announced the strategies for fostering the vocational high schools in order to realize hopes
April 2007	Announced program for building specialized vocational high schools by the Korean governmental ministries
May 2007	Executed the research project about developing program for supporting specialized vocational high schools by the governmental ministries (Professor Na in Seoul National University) Announced a prospectus about schools for the program
October 2007-March 2008	Contracted MOUs -With the Ministry of Agriculture and Forestry (‘07. 10. 30) -With the Ministry of National Defense (‘07. 11. 22) -With the Intellectual Property Office (‘07. 12. 12) -With the Ministry of Maritime Affairs and Fisheries (‘07. 12. 31) -With the Ministry of Labor and the Small and Medium Business Administration (‘08. 3)
March 2008-present	Support 106 schools for building the specialized vocational high schools by government ministries.

Management Models for the Program

The management models for building specialized vocational high schools by the governmental ministries are divided into three as shown in Table 3: Total consignment management model (Model I), Co-management model (Model II), and Supporting program model (Model III) (Na et al., 2007). Model I gives each supporting governmental ministry commission of full power to school management. For example, the ministry can hire the school principal or teachers through an open employment. The supporting ministry funds the schools and those schools need to be restructured into specialized vocational high schools. The supporting ministry can directly educate the required core workforce and can be continuously progressive.

Table 3
Management Models for Building the Specialized Vocational High Schools by Governmental Ministries

Model	Total Consignment Management Model (Model I)	Co-management Model (Model Ⅱ)	Supporting Program Model (Model Ⅲ)
Operation type	Supporting governmental ministry commissions everything about the school management	Both the supporting governmental ministry and the education bureau manage the school	Supporting specialized education program that is needed from supporting ministries
Finance	The supporting governmental ministry -Total cost for school management (School management cost + Vocational high school promotion cost)	The supporting governmental ministry: Additional cost for needed for creating infrastructure for specific manpower Education bureau and ministry of education and human resource development: Cost for manpower and general school management	The supporting governmental ministry: Provides budget for the needed special programs
Estimated investment (per school)	9 Billion	Under 1 Billion	Between 200 million to 300 million
Supported school	National technical schools	Public agricultural and marine schools	Public and private schools
Special features	Directly educates the needed core manpower Could be progressed continuously by supporting ministry's decision Introduced open school principle system	Can provide specialized education that meets the industry needs Could place an open school principle system if needed	Could apply a special program needed to grow the industry-needed manpower ※This program has purpose to be specialized schools that is differentiated from other previous support program.

Source: Ministry of Education and Human Resources Development. (2007c). The plan for program for supporting specialized vocational high schools by governmental ministries.

Model II lets the management by the supporting ministries in association with the educational ministry. The supporting ministry supports additional cost needed for creating infrastructure for specific manpower, the educational bureau and the ministry of education and human resources development support the general school management cost. This model could provide special education that meets the industrial needs, and can place the open school principle system if needed.

Model III requires each supporting ministry to support the required vocational

education programs for the schools. The ministry needs to support the required program costs and should apply the special program for growth of industry-needed manpower. The program is differentiated against few students and a special program for the school education.

The implementation scheduled by each management model for building the specialized vocational high schools is shown in Figure 1. The governmental ministries are scheduled to continuously support those schools including Model I schools from 2008 up to 2012 while the Model II schools are planned to be converted into a total commissioned school in 2010 based on the two-year evaluation results of the co-management model schools. The schools in the Model III will decide on re-investment after the 5 years of management until 2012. However, due to the government plan of switching all national schools to public schools, the policy plan for Model I and II schools would change.

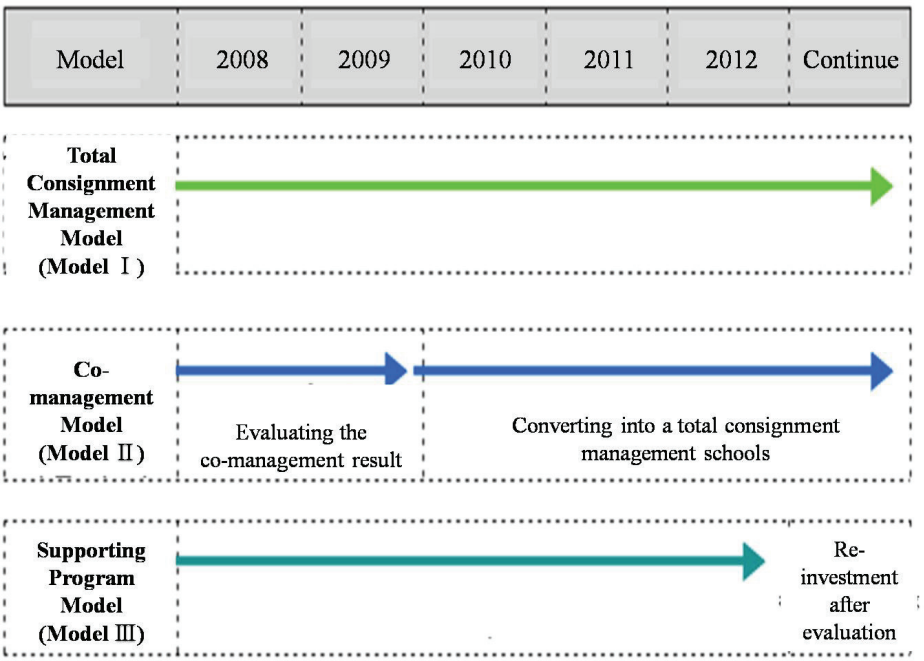

Figure 1. Implementation Schedule by Each Management Model for Building the Specialized Vocational High Schools by Government Ministries
Source: Ministry of Education and Human Resources Development. (2007c).

Management Systems of the Program

The management systems of the policy program are an organic complex as shown in Figure 2. Major participants in the program are the Ministry of Education, Science and Technology (MEST), five other ministries of the government and their program

operation agencies, sixteen provincial offices of education, local government, and 106 vocational high schools and their cooperative industries. The Ministry of Education, Science and Technology is in charge of the general program, and five supporting governmental ministries have a role of financial and managerial supporter to each supported schools. The provincial offices of education support the education encouragement related issues by exchanging information and cooperation. 106 vocational high schools receive the support in employment and career by agreement between according industries, so that it can materialize the vocational education school methods.

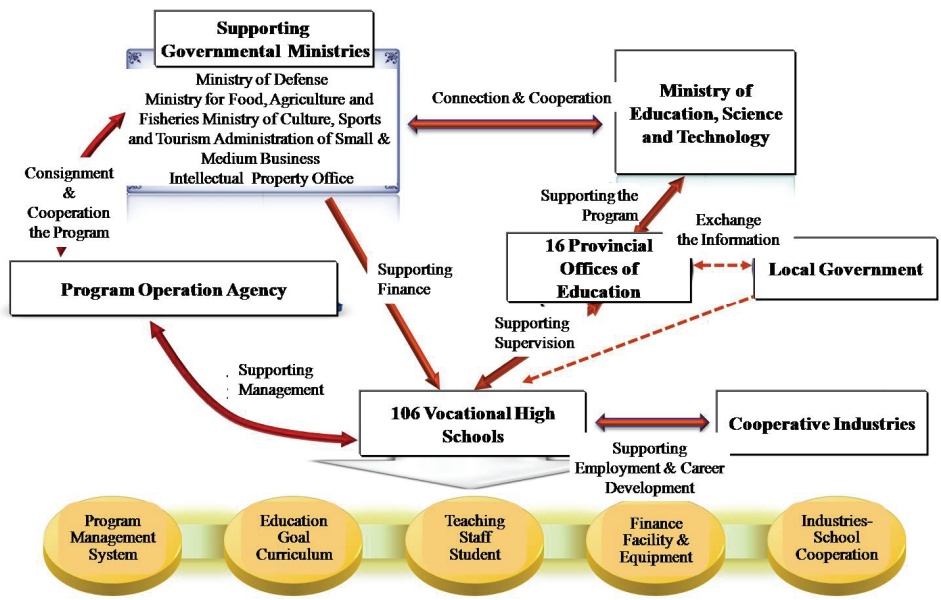

Figure 2. Management Systems for the Specialized Vocational High Schools by Governmental Ministries
Source: Na. (2008). Strategies for revitalizing the management of specialized vocational high schools funded by government ministries. p.3.

Implementation and Management of the Policy Program

Selection of the Schools and Fields of Their Specialization

Since the program to build the specialized vocational high schools by the government ministries was introduced in 2007, 106 schools have been selected by eight ministries. However, because the present administration reorganized the government structure, the vocational high schools by the previous Ministry of Labor and the Ministry of Knowledge Economy were transferred to the Small and Medium Business Administration to support them for their specialization.

Under the present administration, now five ministries that support the vocational high schools include the Ministry of National Defense, the Ministry for Food, Agriculture, Forestry and Fisheries, the Ministry of Culture, Sports and Tourism, the Small and Medium Business Administration, and the Intellectual Property Office. They have supported 106 schools as shown in Table 4 since 2008.

Table 4
The Number of the Schools by the Current and Previous Government Ministries and Their Program Operation Agencies

Current government organization	Previous government organization	Number of schools	Program operation agency
Ministry of National Defense	Ministry of National Defense	10	
Ministry for Food, Agriculture, Forestry and Fisheries	Ministry of Agriculture and Forestry	10	Agriculture Human Resources Development Institute
	Ministry of Maritime Affairs and Fisheries	9	
Ministry of Culture, Sports and Tourism	Ministry of Culture	2	Korea Creative Content Agency
Small and Medium Business Administration	Small and Medium Administration	30	Korea Technology and Information Promotion Agency for SMEs
	Ministry of Commerce, Industry and Energy/ Ministry of Labor	36	Korea Institute for Advancement of Technology
	Ministry of Information and Communication	5	National IT Industry Promotion Agency
Intellectual Property Office	Industrial Property Office	4	Korea Invention Promotion Association

The Model I (Total Consignment Management model), in which the supporting ministry manages the general school issues, is managed on 2 national technical schools, the Model II (Co-management model), where the supporting ministry manages the school with the provincial offices of education, is executed in 13 public vocational schools (10 agricultural schools, 3 marine schools). Also the Model III (Supporting Program model), 91 public and private schools (10 schools from the Ministry of National Defense, 6 schools from Ministry for Food, Agriculture, Forestry and Fisheries, 2 schools from the Ministry of Culture, Sports and Tourism, 69 schools from Small and Medium Business Administration, and 4 schools from the Intellectual Property Office) are supported.

In the meanwhile, the other government ministries excluding Ministry of National Defense and Ministry for Food, Agriculture, Forestry and Fisheries (Fisheries Sector) support schools with help of the program operation agencies for performing the program effectively. From 2008, the Ministry of Culture, Sports and Tourism has selected and cooperated with the Korea Creative Content Agency, and the Intellectual Property Office have cooperated with the Korea Invention Promotion Association as a program operation agency. From 2009, the Ministry for Food, Agriculture, Forestry and Fisheries

(Agriculture Sector) plans the Agriculture Human Resources Development Institute, and Small and Medium Business Association plans Korea Technology and Information Agency for its program operation agency.

Table 5 shows which ministry section supports which specialties. The Ministry of National Defense focuses to develop army-related workforce, the Ministry for Food, Agriculture, Forestry and Fisheries (Fisheries Section) plans to educate workforce for marine management and oceanic industry, the Ministry of Culture, Sports and Tourism focuses on cultural sections, the Small and Medium Business Administration educates manufacturing skills (metal, heat treatment, surface treatment, etc) and manufacturing support industries (design, communications, management consulting, surveying, etc), the (ex) Ministry of Commerce, Industry and Energy and the Ministry of Labor focuses on machines, electronics, e-biz motors, ships, chemistry, metal, fiber, semiconductors, and displays. The Ministry of Knowledge Economy supports software and web development, information process, Internet, network associated sections, and the Intellectual Property Office supports jobs from inventions and creating experts in property associated sections.

Table 5
Areas of the Specialization by Governmental Ministries

Government Ministries	Specialized Area	Remarks
Ministry of National Defense	Army related workforce	
Ministry for Food, Agriculture, Forestry and Fisheries	Agriculture and food industries	Agriculture sector
	Marine management and oceanic industries	Fisheries sector
Ministry of Culture, Sports and Tourism	Culture industries	
Small and Medium Business Administration	Manufacturing skills(metal, heat treatment, surface treatment, etc)	
	Manufacturing support industries(design, communications, management consulting, surveying, etc)	
	Machines, electronics, e-biz motors, ships, chemistry, metal, fiber, semiconductors, and displays	(ex) Ministry of Commerce, Industry & Energy and Ministry of Labor
	Software and web development, information process, internet, and network associated sections	Supported by Ministry of Knowledge Economy
Intellectual Property Office	Inventions and creating experts in property associated sections	

Source: Ministry of Education and Human Resources. (2007c). Prospectus for Choosing Schools for Vocational High Schools by Korean Governmental ministries

Current School Management Status by Governmental Ministries

The operating purpose of the policy program is to produce the core workforce with both knowledge and practical competencies on demand of their interested industries, the specialized field is set based on the demand from individual governmental ministry, and currently 106 schools are being supported in Table 6.

Table 6
Current School Management Status by Supporting Government Ministries

Government Org.	Ministry of National Defense	Ministry for Food, Agriculture, Forestry & Fisheries		Ministry of Culture, Sports & Tourism	Small & Medium Business Administration	Intellectual Property Office
		Agriculture	Fisheries			
Purpose	Early training military personnel	Fostering agricultural workforce	Fostering professional fishermen	Early training talented personnel	Fostering workforce for small & Medium Business.	Cultivates creative and valuable men of ability
Areas of specialization	A field particularly related to military service	Agriculture management Food industry	Fisheries management Marine product	Industrial design	Small & medium manufacturing and service IT related field	Enterprise/ patent administration through invention
Number of school	10	10	9	2	71	4
Management model	Model Ⅲ	Model Ⅱ	Model Ⅱ Model Ⅲ	Model Ⅲ	Model Ⅰ Model Ⅲ	Model Ⅲ
Budget for each school (million won)	300	80-120	10-520	144	Model I: 440 ModelⅢ: 193-225	300
Years of period	5	5	5	1-2	2-5	5

Source: Ministry of National Defense. (2009). Operating military specialized high schools in 2009.
Ministry of Education, Science, and Technology. (2008). Data of present condition of Specialized high school.
Ministry for Food, Agriculture, Forestry and Fisheries. (2009). Plan for operating a program to foster men's ability in specialized agricultural high school through spot experience training education.
Ministry for Food, Agriculture, Forestry and Fisheries. (2008). Plan for supporting fishery high school to specialize in 2009.
Ministry of Culture, Sports and Tourism. (2009). Plan a business for specializing culture contents high school in 2009.
Small and Medium Business Administration. (2009a). Basic plan for fostering specialized high school in 2009
Intellectual Property Office. (2008). Data of present condition of Specialized high school

The supporting periods for Ministry of National Defense, Ministry for Food, Agriculture, Forestry, and Fisheries, and the Intellectual Property Office are 5 years. But in the case of supporting budget, very limited amount of money is provided for the

program, and the problems are more severe in some ministries. The Ministry of Culture, Sports and Tourism had a system where schools are supported for only 2 years in 1 year basis, the Small and Medium Business Administration associated schools selected by the program of industries-school cooperation only offers support for 3 years, and the Ministry of Information and Communication only supports up to 2 years.

Issues and Strategies for Revitalizing the Policy Program

Considering Major Issues for the Policy Program

The annual reports of the program showed that it has been successfully worked in accordance with the plan. At the same time, however, some issues have been occurred.

First, there were still confusion in operation of the program among supporting governmental ministries and supported vocational high schools because there was no systemic handbook or manual for implementing of the program. The program is that governmental ministries are in charge of supporting schools although there is a need to make decisions about school operation systems and curriculum under administration and encouragement of Education Bureau of Cities and Province following the law such as the Law about Elementary and Middle Schools. Even though supporting governmental ministries, Ministry of Education, Science and Technology, Education Bureau of Cities and Province, and each school need lasting and organic cooperation; in reality, the course and the guide of running a program is totally different, and there is no system that can help them share. Moreover, there are problems between the previous administration and new administration because new administration has been started and new programs and policies has been carried out about supporting the vocational high schools after starting to run this program.

Second, the establishment of the program is not clear. The aim of the program is to foster the core technical workforce in each field of industries with a national supporting industries and a high-tech industry, however, the specialized curriculum area of each school and that of participating departments are often not the same. That is why it needs a solution to strike a balance. Particularly, this program is for total schools, but each school recognizes that this program is just like the previous financial supporting program, they do same as before. Also, the schools are running the same or very familiar programs that they have ran before so that there are difficulties to foster the students' ability the government wants.

Third, each school is not enough to accept the industries' demand for developing curriculum and does not have the right to choose, to make a schedule for education, and to select proper text books. To foster students' ability that is demanded in industrial settings, custom industrial setting education and operation are needed, but each school is focused on teachers and visiting the industrial settings rather than making an effort to reflect other demands. Also, each school's right for scheduling the curriculum is limited because they have to observe the national standard about curriculum, the text books are

needed to follow approval process of Education of Bureau of Cities and Province like other schools.

Forth, the program is operated by the school administrator, teacher in chief, and some teachers, resulting in difficulties in driving a program on total school. In order to run this program efficiently, school administrator's exuberant intention about the program, teacher's professionalism in the field, and a cooperation of all teachers are certainly needed. However, many schools often face difficulties from the lack of understanding, intention, and some other reasons. Also, there is a need to obtain more professionalism from the recent content through the specialized program.

Fifth, there is no an appliance system that can choose proper students for this program. Many students are applying for these specialized vocational high schools because of their low achievement scores. Since schools have their own educational purpose, therefore, they should recruit students who are proper to their educational purpose. Some students may drop out of the schools because schools do not suggest a vision for them to go through a career path in a specific field and because they can't have the opportunities that find their careers through their schooling.

Sixth, financial support is not enough to build the specialized vocational high school, and there is no flexibility for spending budgets. As long as a MOU is in effect, budgets have to be supported according to the plan. However, the actual budget in 2008 was generally decreased compared to early program plan resulting in difficulties for spending budgets by the plan in each school. Moreover, the lack of flexibility for spending budgets causes difficulties to operate the program because of limitation for the percentage of some categories.

Seventh, in order to perform the specialized program, new facilities and devices are needed to be placed. However, there are strict restrictions about organizing the budget, and the budget for facilities and devices is decreasing after the second year of this program.

Eighth, schools and workforces do not have a relationship in smooth water because each school has not enough information about good workforces, and good workforces are not interested in the school. Also, schools are focusing on external relationships such as an arithmetic conferences and training on the workforce so that, substantial results like giving a job opportunities for graduated students are insufficient.

Strategic Tasks for Revitalizing the Policy Program

The vision of the policy program is to cultivate the core workforce with both knowledge and practical skills so that let each government ministry directly participates and involves in supporting for building the specialized vocational high schools in accordance of the industrial demands for fostering core technology industrial experts. Strategic tasks are establishment for industrial experts training, presentation of various visions based on the student's nature and aptitude, operation of field-centered specialized curriculum, and reinforcement of the capability of the teaching staff. In the meantime, Ministry of Education, Science and Technology, supporting governmental

ministry and wholly responsible body of the program, provincial office of education, close relationship and support of unit school all have to be part of the foundation. Moreover, areas for activating this program are program management system, specialized education direction, and components of specialized education (curriculum, teaching staff, student, finance, facility and equipment, industries-school cooperation). The propelling assignment of activation for the program can be referred to Table 7. The propelling assignment has 33 assignments for program management system, specialized education direction, and components of specialized education.

In program management system, challenges include the organizing council to promote communication and cooperation of main participants, common management guidelines for business operations, program-related information management and sharing system, gauges measures differentiate between other specialized financial aid program for vocational high schools, establish practical operating plan for nationalized direction (Model I, II) is required, the direction of the specialization region issues the specialized promotes to the human resources department required by the ministries, the purpose of promoting the full characterization to achieve business purpose, the center school system operations, specialized each unit schools' differentiated educational program development and operations, taking measures for each school with annual evaluation and consulting must be done.

Components of specialized education related to curriculums issues the compilation curriculums and operational autonomy of the larger, industry centered curriculum development, simplification the teaching material authentication process and expansion the liberalization of selected materials, full use of teaching-learning practice-oriented and the proposals for teachers issue the foster the school administrators and teachers' mind, the preferential plan for the business dedicated teachers and excellent teachers participating in, the stable supply with excellent teachers, expansion the opportunities that teachers enhances their expertise for specialized education, support the recruitment for industry personnel and industrial and academic Adjunct teacher, the proposals for students issue the systematic selection and management of specialized students, strengthen humanity education and basic learning ability, career development support specialized students, after graduation, continuing education opportunities for workers granted that can be addressed.

The financial proposal issues expansion of budget support with MOUs, prohibit duplication budget support assistance and support new selected schools, preparing and opening operating model and outlines of budget support for each school, efficiency and expansion flexibility of operating costs, support the school's operating costs must be considered in accordance with, and the proposals for facilities and equipment issue expansion flexibility of the budget outlines of the facilities and equipment purchase, substantial facilities management and equipment share, finally, university-industry cooperation region include promoting industry-university cooperation and providing information about possible industry, come up with solutions for Facilitation the participation of industry, each support ministries conjunction and interaction with industry should be done.

Table **7**
Strategic Tasks for Revitalizing the Policy Program to Build the Specialized Vocational High Schools

Activation Area	Strategic Tasks
Program management system	Organizing council to promote communication and cooperation of participants Arrangement common management guidelines for program operation Program-related information management and sharing system Differentiating other specialized financial aid program for each school Establishing practical operating plan for nationalized direction
Direction of specialization education	Specialized promotes to the human resources department required by the ministries Purpose of promoting the full specialization to achieve business purpose Center school system operations Specialized each unit schools' differentiated educational program development and operations Taking measures for each school with annual evaluation and consulting must be done
Components of specialization education	
Curriculum	Compilation curriculums and operational autonomy of the larger Industry centered curriculum development Simplification the teaching material authentication process and expansion the liberalization of selected materials Full use of teaching-learning practice-oriented
Teaching staff	Foster the school administrators and teachers' mind Preferential plan for the business dedicated teachers and excellent teachers participating in Stable supply with excellent teachers Expansion the opportunities that teachers enhance their expertise for specialized education Support the recruitment for industry personnel and industrial and academic Adjunct teacher
Student	Systematic selection and management of students Strengthen basic learning ability and humanity education Career development support about students Providing continuing education opportunities after graduation
Finance	Expansion of budget support with MOU Prohibit duplication budget support and support new selected schools Preparing and opening operating model and outlines of budget support Efficiency and expansion flexibility of operating costs supporting the school's operating costs
Facility & equipment	Proposals for facilities and equipment issue expansion flexibility of the budget outlines of the facilities and equipment purchase Substantial facilities management and equipment share
Industries school cooperation	Providing information about industry Come up with solutions for Facilitation the participation of industry Each support ministries conjunction and interaction with industry should be done

Conclusions and Recommendations

The policy program for building specialized vocational high schools by government ministries of Korea has been introduced to restructure vocational high schools into the specialized ones and to produce the core technical workforce on demand of each ministry' interested industries.

There are three management models for building the specialized vocational high schools: Total consignment management model (Model I), Co-management model (Model II), Supporting program model (Model III). In 2007, a total of 106 vocational high schools have been selected by five ministries for the program. To make sure that the policy program goes forward according to the plan, memorandum of understandings (MOUs) between MEHRD and involved ministries were contracted and those schools have been funded and managed in accordance with each ministry's direction since 2008.

An interim or annual reports of the program showed that it has been successfully worked in accordance with the plan. At the same time, however, some issues have been occurred: for example, lack of active interaction among involved governmental ministries, provincial offices of education and vocational high schools and the different scale or unit of the school's specialization. The first year propelled program results have not yet established a operating system, clearly the direction of promoting program are not shared, departments and units have difficulty in promoting the program. In addition, enforcement unit schools' specialized curriculum have difficulty in organizing, operating field-centered curriculum and strengthen the professionalism and program participation of teachers, and showing students career visions. Therefore, to improve these problems and revitalize the program the improvement of business operation system, the direction of the specialization, specialized education is derived.

To execute the program so that the program could be promoted for future, the following efforts by the participating entity are required. Ministry of Education, Science and Technology plays a role as coordination and administrative support, organizes business operations council and run regularly, and makes efforts that the supporting business departments actively involved in, unit schools to promote the full specialization. Supporting ministries do not consider program as a one-time financial support program but promote it as a long-term plan, personnel changes in ministries that are often careful not to hinder the flow of program process, granted the flexibility of the unit schools' expenses, and to conduct the annual evaluation and consulting support, making specific principles to appoint specialized schools and autonomous schools, teaching materials certification procedures, the teacher circulative work, attribute to secure financial and academic support for adjunct teachers. Finally, the supported unit schools recognize success and failure of program is depended on future career of vocational high school, makes effort to make a result, promote the program with reflect the support agencies' requires. It should come up with ways to promote that all teachers actively participate in the program and make efforts to develop specialized training programs differentiated with other schools.

Although the program is still under the implantation, it could be a benchmark for

other Asian countries to support their vocational high schools or secondary vocational education.

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An Analysis of the Policy for Chinese Technical and Vocational Education and Training's Development

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ABSTRACT The development of vocational education needs support and guidance of national policy. This paper interprets and analyzes policies' change for developing Chinese vocational education from eight aspects which are the status and role of TVET, vocational education system, vocational education management system, vocational education running-school system, vocational qualification certificate system, the construction of the basic capabilities of vocational education, vocational education assistance system for students in poverty and teaching reform of vocational education since the reform and opening up.

KEY WORDS TVET(Technical and Vocational Education and Training), Developing Policy, Vocational Education, China

Introduction

Technical and Vocational Education and Training (TVET) is not only a part of the whole educational system of a country but also the important foundation of social development. TVET has become the essential way of promoting employment and economic development and enhancing a country's competiveness. Ever since the reform and opening-up, especially with the coming of the new century, China has made it a basic national strategy to vigorously develop TVET and issued a series of TVET policy, which has effectively emphasized the role and status of TVET, expanded the understanding of Vocational and Technical Education (VTE) of the whole society and constructed a positive policy environment for developing TVET. The TVET policies issued and implemented in recent years have played a great role in macro adjusting and guiding the TVET development and make it possible for TVET to provide solid talents support for a better and sustainable development of China's society and economy.

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The Status and Role of TVET

Since reform and opening up, the issue of the status and role of VTET in china has been discussed further and further again. In 1985, The Decision of the Reform of Education System of the Central Committee of the Communist Party of China put forward that secondary VTE must be closely combined with the needs of social and economic development. In cities, it must meet the needs of improving enterprises' technology and level of Management and developing the tertiary industry; in rural areas, it must meet the needs of adjusting of the industrial structure and the farmers' needs of working decently to be rich. In this very Decision, it is clearly set forth that VTE should adjust itself to the needs of socio-economic development. In 1996, The Vocational Education (VE) Law emphasized that "VE is an important part of the national education and an important way to promote the economic and social development and employment." Thus it is through law that VE's status and role has been confirmed in promoting Chinese socio-economic development and employment. In 2002, The Decision of the State Council on Making Great Efforts to push forward the Reform and Development of Vocational Education put forward that "VTE is an important part of China's education system and the foundation of the national economic and social development." And VE must serve for the following aspects "the economic restructuring and technological progress, the employment and reemployment, agriculture, rural areas and farmers and the advancement of the western development. The above four services, which have a strong spirit of the times, show that for the first time in China to integrate the development of VTE into the overall socio-economic development." The four services also clearly indicate the change of the relationship between VTE and social-economic development, which in the past was more self-oriented development but currently pays more attention to the social needs, emphasizing service and adjustment. The four services also clearly indicate the direction of how to run Chinese VTE and expansion of the functions of running VTE.

In 2005, The Decision of State Council on Pushing the Development of VE Vigorously, which clearly takes the VE as an important foundation of economic social development and strategic focus of education, specifies that VTE should serve for China taking a new road to industrialization, for adjusting and changing economic structures and its ways of growth, for transferring the rural labor, for constructing the new socialist countryside and for improving the quality of laborers, especially their professional capabilities. Therefore, VE is to have an in-time adjustment of majors and the models of talents cultivating, centering on taking a new road to industrialization and based on the new requirements for laborers' knowledge, skills and attitudes raised by Industrial structure prioritizing and upgrading, so that the majors that are geared to the new industries and modern services should be set up and speeding up the cultivation of the much-needed skilled talents for production and service industry. At the same time, through providing various types of vocational education and training, the VE is to promote a scientific and orderly transfer of rural laborers and the farmers getting rid of poverty and working hard to be rich. VE is also to improve vocational skills of farmers

who float into cities and towns by assisting them to have a stable employment. Besides, VE is also to make contribution for the construction of new socialist countryside by providing the qualified talents support. Thus, the rural VE schools are all to be developed into a multi-functional and comprehensive services entity so that they can on a large scale train rural laborers to become talents with practical skills, extensively spread the advanced and practical agricultural technology, and with great efforts enhance farmers' ideological, moral, scientific and cultural qualities.

Construction of VE System

The evolution of the system of VE of our country since the reform and opening-up mainly reflects in the following important policy documents: The Decision of the Reform of Education System of the Central Committee of the Communist Party of China, issued in 1985, put forward that the structure of secondary education is to be adjusted and put great efforts in developing secondary VET, and "gradually establish a VET system which not only covers from junior to senior VET and have a good match with all industries in a good ratio but also has a scientific structure and is flexibly related to general education". In 1991, according to the requirements for diversified talents in realizing the strategic goals in the second stage, was issued The Resolution of State Council on Making Efforts in Developing VTE, in which the great and specific goal is put forward to strive hard to construct a comprehensive VTE system which bears Chinese characteristics, covers all levels from Junior to senior, has a good match with all industries, structures scientifically and with all kinds of models and patterns; Moreover, it can also flexibly communicate and harmoniously coordinate with other forms of education. The 1996's Vocational Education Law proposes to institute and improve a vocational education system under which vocational education and vocational training shall be developed concurrently and vocational education shall be connected with other education with coordinate development of both. Further on in 2002, The Decision of the State Council on Making Great Efforts to Push forward the Reform and Development of Vocational Education, the new goal of VE system is specified: A new modern VE system is strived to be initially built during the 11th-Five Years, which not only adapts itself to the socialist market economy and has a close combination with market demands and employment but also bears the following characteristics: with a scientific structure, being flexible and open, being distinctive and able to self-develop. To realize the goal, the requirements are detailed in the law, too. In November, 2005, the State Council held another national conference on VE and issued The Decision of State Council on Pushing the Development of VE Vigorously, emphasizing that VE should be the important foundation of economic and social development and the strategic focus of education. The Decision clearly states that "Further efforts are to be made to institute and improve a modern VE system which bears Chinese characteristics, adapts itself to socialist market economy system, meets the people's demands for life-long learning and is closely connected with market

demands and employment. This VE system also encourages the co-operation between schools and enterprises, the coordination between work and study, structures scientifically, diversifies in models and patterns, and is flexible, open and self-developing."

Based on the goal of VE system specified in different times, it is self-evident that the development of VE system has the following characteristics: 1) property shift. Previously the VE system is only an issue within education as a whole but gradually it is becoming more related to not only the countries' or regions' economic and social development but also with individuals' personal life-career; 2) the content expansion. Previous the VE system only aims to build a scientific system with a rational structure but currently it more strives at self-development and special features; 3) Epochal and national characters outstanding and distinctive. The goal development from just setting up a VE system to one that is both modern and characteristic of China makes the VE epochal and national characters distinctively stand out. Therefore, it can be put this way that the targeted VE system specified in The Decision of State Council on Pushing the Development of VE Vigorously will guide the future development of China's VE system.

With a full analysis of the new goals for the 21st VE system development, three aspects are covered: 1) Close connection is built between the development of VE and economic and social development. That is, the development of VE must be closely connected with China's economic reforms, the adjustment of industry structures, and the change of employment, transferring the social demands for employment; 2) Making the VE development closely connected with individuals' career development, meeting peoples' need for a life-long learning; 3) Being clear about the properties of modern VE: the co-operation between schools and enterprises, the coordination between work and study; scientifically structured and patterns and models diversified; Being flexible and open and capable of self-developing. The former two clearly define the models for cultivating talents, emphasizing the significance of VE cooperating with industries and enterprises so that practicality is strengthened in teaching and students' practice capability can be fully developed. As for the other characteristics, firstly VE system should be scientifically structured, which refers to the layout of the VE structure, the structure of VE majors, the structure of levels, and the structure of regions adapting to the development and changes of economic and social development, and at the same time the VE must be inter-connected and coordinate with general education and higher education. Secondly, The VE system should be flexible and open, which means that it has to be developed based on the demands of society and market so that the system could be flexible, diversified patterns and models of running VE schools would be adopted and new and open situation of running VE would be formed. And lastly as for the character of VE self-development, it refers to the VE schools, in accordance with the market changes and social demands, capable of continuously self-adjusting, expanding their autonomy of running schools, enhancing their capability of running schools and improving and strengthening themselves (Lin, 2004).

Innovation of the VE Management System

It has always been the key issue attached great attention in VE reform to straighten out management system, to form the effective management mechanism, and to establish management patterns adapted to the market. For a long time, the Management pattern that China's VE management system follows is "strips and blocks combining together, giving first place to the block." Thus formed is the model of running school: The one who runs school is also the one who does the management and benefits from running VE schools, which combines the running and management of the VE schools into one. This way of running VE schools leads to many problems such as multiple heads of management, functions overlap, lack of overall planning, the hardness of resource -advantages being used as whole, and low efficiency of running school, etc., which make the VE difficult to meet the need of the further development of socio-economy and VE itself. In order to solve all these problems, a series of policies have been issued, in which it is clearly put forward to have a further reform on the VE management system.

The VE Law of 1996 regulates, "Local People's governments at county level and above shall strengthen the leadership, overall coordination, supervision, direction and assessment with regard to the work of vocational education in their own administrative regions." This specifies that the local governments determine and administer the work of VE in their own regions in accordance with the socio-economic development of their regions. In 2002, The Decision of the State Council on Making Great Efforts to Push forward the Reform and Development of Vocational Education, notes to "set up and gradually improve a VE management system which, under the leadership of the State Council, will adopt the model of hierarchical management with the local regions as the mainstay, with the governments' overall co-ordination and with the whole society's participation." Under the leadership of the State Council, VE Inter-ministries Joint Meeting System is to be set up and to study and solve the significant issues of VE Work. The Educational Administrative departments of the State Council are to be responsible for the overall planning of VE work, comprehensive co-ordination, and macro-management. And the Labor Security Department and others are to perform their duties and be responsible for the concerned VE work. The construction of the VE Inter-ministries Joint Meeting System lays a foundation for the reform on the VE management system concerning the leadership. Thereafter, the provincial and municipal governments establish the same system successively and coordinately solve the significant issues in VE reform and development.

In recent years, the innovation of management system is mainly embodied in the following two aspects: Firstly, the State Council establishes the VE Inter-ministries Joint Meeting System. Under the leadership of the State Council, the development of VE is closely connected with both economic and social development and labor and employment. By way of this, all the ministries will cooperate with concerted efforts and try to overall supervise and solve the issues concerning the essential and macro policies on VE. Thus, the development of VE will remain on the virtuous circle and entirely

change the old long-established management system of "strips and blocks combining together, giving first place to the block" into a new one, which emphasizes the governments' role of overall planning and turns the VE development and that of the whole socio-economy into one. Moreover, the targeted VE management system also does good to optimal allocation, changing the situation of previously running school that is close, overlapping, and inefficient, promoting the co-operation between the educational departments and human resources departments, realizing the high efficiency of running VE. Secondly, the responsibility of local governments in VE development is strengthened. The Decision of the State Council on Making Great Efforts to push forward the Reform and Development of Vocational Education clearly states, "Primarily It is the local governments' responsibilities to promote the VE development. Local People's governments at county level and above shall strengthen the leadership and overall coordination, and in accordance with the regional reality of economic construction and social development, institute policies and measures to promote VE development and study the existent problems and solve them", And strengthened is the responsibility of municipal (local) governments for the overall planning of VE development. By way of the overall planning the municipal (local) governments promote the VE and other types and levels of education to develop coordinately, construct the multi-channel mechanism of raising VE funds, and organize and encourage the social forces to run VE. All kinds of VE resources shall be integrated and fully taken advantage of, with departments and different types of schools breaking segments and market mechanism playing a positive role so that the efficiency of running school can be enhanced, the structure of VE schools can be upgraded and the loss and waste of VE resources can be prevented.

Strengthening the local governments' responsibility for VE development is mainly to strengthen the municipal governments' overall management on VE. As China restructuring its economy, speeding up regional economic development has become an important trend in China's economic development. VE and regional economic development are more and more closely connected. The municipal (local) governments' overall planning will promote the closer connection between VE and regional economic development. The local governments' overall management on VE mainly includes the following four aspects:

1) Overall planning. Overall planning is an all-round, systematic plan on and design for the regional VE development, which is aimed to adapt the VE scale, structure and development model to the region's economic and social development and promote the VE to develop coordinately with other education. The overall planning, as a process of strategic planning and a process of implementing, is the essential responsibility of local governments. The strategic planning for VE development should be part of the overall scheme of regional economic and social development so as to ensure the synchronization and co-development of VE and social-economy. At the same time, the overall planning lays a good foundation for a law-based administering.

2) Overall resources-planning. Overall resources-planning includes both interior and exterior planning. The former refers to the VE institutions in the whole educational

system being merged based on the actual demands. The latter refers to the overall maximum integration of the VE institutions scattered in the concerned departments such as the Labor Security Departments, the Agricultural Departments, the Health Departments, the Scientific and Technological Departments, the Personnel Departments and so on. Through the interior and exterior overall planning, departmental segments and limits of different types of schools can be broken down, the existing VE resources can be integrated and used and, according to regional demands for economic development, the layout of the school structure can be optimized, and making the scattered VE resources centralized into advantageous resources, which shall put up a VE resource-sharing platform, form strong joint VE forces and promote VE's healthy and sustainable development.

3) Overall policy-planning. Overall policy-planning refers to the regional VE development policies and measures shall be made in accordance with the national VE development policy and the demand of regional socio-economic development. For example: the overall planning for the school enrollment and employment systems, for school majors setting up and for funds raising and spending are all included. The overall policy-planning contributes to the forming of a social environment that is in favor of the coordinated development of VE and economic society.

4) Overall planning for school-running. This aims to set up a multi-patterns of running school which insists on the governments being the mainstay of running school and at the same time support industry administrative departments and industry organizations, enterprises, and social forces to run VE schools in an overall and coordinated way, forming the governments-leading, and the industries, enterprises and social forces actively participating pattern.

The Innovation of Running School System

Since the reform and opening up, the following important documents embody the reform process of the system of running VE schools. In 1985, The Decision of the Reform of Education System of the Central Committee of the Communist Party of China point out: "Enterprises and Industrial organizations should be actively involved in developing VTE and any collective, individual and other social forces are encouraged to run VTE. It is advocated for any institutions and departments to run VTE independently, collaboratively or co-operatively with the Educational departments." This shows that: China, at the initial stage of transforming from the state-plan economy to the market-oriented economy, besides the governments' running VTE, it is actively promoted and with the guidance of all kinds of policies for any enterprises and industrial institutions to run VTE. The Vocational Law of People's Republic of China of 1996 specifies clearly: "Local People's governments at county level and above shall sponsor vocational schools and vocational training institutions and make them as mainstays and examples", "The competent departments of the governments and trade associations shall jointly sponsor or sponsor on their own vocational schools and

vocational training institutions, organize, coordinate and direct the enterprises and institutional organizations of their own sector or trade in running vocational schools and vocational training institutions." "Enterprises shall, in accordance with their actual situation, give vocational education in a planned way to their staff and workers and persons to be employed." This Law primarily establishes the multi-patterns of running schools with the governments being the mainstay and together with enterprises and institutional organizations, and social forces of running VE schools. The Decision of the State Council on Making Great Efforts to Push forward the Reform and Development of Vocational Education issued in 2002 reiterates: "Through deepening the system reform of running VE school, to be formed is the multi-patterns of running school with the governments being the mainstay and together with enterprises and institutional organizations playing a role, and social forces actively participating." It can be seen that two aspects are stressed. One is that the thinking of the VE system reform follows that only when all organizations, institutions, and social forces play their full role and run VE schools collaboratively, can the overall effects and benefits be achieved. The other is that the innovation of the system is the characteristics of current VE reform, the goal of which is to fully embody the benefits of all parties concerned such as governments, enterprises, industrial organizations, and individual citizens so that gradually and finally set up is a system of running VE adapted to multi-economy and multi-subjects of running schools.

The above goals of the VE system defined in different historical times show that the system goal of running VE has changed from the pattern with the governments as the mainstay and the industries, enterprises, and social forces advocated to run VE to the pattern with the governments as the lead and the industries, enterprises, and social forces to co-run schools as the subjects. With the guidance of government policies, broken through is the old pattern of the governments takes on everything in running VE schools, strengthened is the running school of industries and enterprises, and playing a role is the market mechanism. However, it still needs the guidance and regulation of the concerned policies as far as how to form the multi-pattern of the VE system with the governments as the main lead in running public VE, collective running but state owned, collective running with public support, the running school of industrial institutions and enterprises, individuals running schools, and the joint-running with overseas countries.

Therefore, the innovation of the VE-running system mainly embodies in the following aspects: The governments are the main lead in the whole management of VE, including taking the charge of the direction and the thinking of running VE schools. The emphasis lies in running well the VE schools which are mainstays and examples and the VE training institutions. Industrial institutions and enterprises are to be supported and guided in running VE schools and training organizations. At the same time to be explored is the multi-subject system of running VE schools, such as the educational stock-holding system, two systems for one school, state-owned but collective running, collective running with public support and so on, with the governments' role played as being the main lead. As the main forces in multi-pattern of running VE schools, industrial institutions and enterprises are to be strengthened through making the new

measures adapted to the whole adjustment. The administrative Department of the Trade is co-ordinates and gives the professional guidance in the vocational education and training (VET). The trade organization is to do the prediction of human resources, making plans about the VET of the concerned trade, conducting the teaching reform of the VE of the concerned trade, the construction of textbooks, and the training of the teachers. It has been the main task in innovation the VE running system for different trades and organizations to enforce the professional management. It has been the mission of the enterprises, based on the guidance of the laws, to run VE schools and to conduct VE training. The enterprises needs to fully take into account the reality, make plans for VE and training of the staff, strengthen the construction of the training base, conduct all kinds of post training and collaborate widely with VE schools and training organizations to run VE, by way of which all the parties involved are to set up VE goals together and shoulder their obligations such as expanding the basic construction, improving the conditions of running schools, and promoting the integration of production, teaching and researching. Meanwhile, enterprises are empowered to participate in management and to take their responsibilities in accordance with their powers. As for the active involvement of social forces in running VE, it mainly refers to the development of collective running of VE and sino-overseas running VE collaboratively. On one hand, stressed is the governments' role in scientifically guiding and the managing the two types of VE schools. On the other hand, the governments should take the responsibility to support and subsidize the above mentioned two types with a series of policies and measured made, for the support and financial aid of the governments are the effective means to enhance the quality of social forces running VE, so that gradually it will be realized that these types of VE schools enjoy the similar protective measures as those of the public-owned VE schools. In summary, as long as the running of VE schools and training organizations is in accordance with the concerned laws and regulations, favorable to the increase of educational investment, favorable to the expansion of educational resources and scales, and the enhancement of educational qualities, and favorable to meet the educational demands of the society, all kinds of patterns of running schools can be taken a venture and explored.

Vocational Qualification Certificate System (VQCS)

Establishing and improving the VQCS is an important means to ensure the development of VE, which also corresponds to VE worldwide trend. The VQCS has always been an essential part of China's VE system. Since the 1990s, China has carried out a series of work to construct and promote VQCS. In the 1996's Vocational Education Law it is stated clearly that "Vocational education shall, in the light of actual needs and according to the vocational categories and vocational grade standards, adopt systems of academic credentials, training certifications and vocational credentials." In March 2000, the Ministry of Labor and Social Security issued The Regulations on the Enrollment of Technical Category of Skilled Staff, which identifies 90 categories of work requiring a

professional vocational qualification certificate. In 2002, The Decision of the State Council on Making Great Efforts to push forward the Reform and Development of Vocational Education further specifies to "improve the systems of academic credentials, training certifications and vocational credentials", and the concerned main tasks in order to have the systems effectively improved. Firstly, the system of vocational credentials must be put into practice with efforts in vocational schools, credential education must be strongly linked with the standards of vocations, and specialty provision and the content of courses must be closely connected with labor market. Secondly, the role of vocational schools and training institutions shall be fully played in boosting the VQCS and in those advanced schools and institutions can be built the stations of the concerned vocational skills identification or the agencies responsible for the vocational qualification examination. Thus, the education in vocational schools and the appraisal by way of vocational qualification examinations can have an organic combination, the agencies responsible for the appraisal, in accordance with the characteristics of vocational schools, and make arrangements for examinations and the appraising plans. Thirdly, the obtainment of vocational qualification certificates shall closely connect with credential education, reducing unnecessary overlap and improving efficiency and effectiveness. Guided by that, the graduates of vocational schools shall only need to have their operational skills appraised when they apply for an appraisal for a qualification of secondary or lower vocational skills. Similarly, the graduates from those excellent vocational schools and with the main majors of the schools shall be awarded the corresponding qualification certificates together with their educational diplomas.

In conclusion, the VQCS in practice plays an essential role, which is not only beneficial to getting rid of the deficiency of vocational education and training detached from production and reality but also to the issue resolution of the irrationality of the structure of the human resources in China and the serious shortage of technical talents of mid- & senior levels.

Strengthening the Construction of the Basic Capabilities of VE

The basic capability of VE is the key to enhance its quality. In order to strengthen the construction of the basic capabilities of VE, The Decision of the State Council on Making Great Efforts to Push forward the Reform and Development of Vocational Education, issued in 2002, clearly specifies "to strengthen the construction of VE center at county level,…to strengthen the construction of exemplary vocational schools and institutions…to strengthen the construction of teaching staff." In order to promote the construction of basic capabilities of VE, the State Council has made the decision that during the 11th Five-Year Plan period, ￥10 billion are to be invested by central finance on VE, mainly used to support the implementation of "Four Plans". Those are: "The Plan for Constructing the VE Training Base." According to that plan, the emphasis is to build 2000 training bases with complete types of majors, high level of equipment, and the sharing of high quality resources. According to "The Plan for Construction of VE

Center at the County Level," the emphasis is to support of the construction of 1000 VE centers at that level and make them into the important bases which can conduct human resources development, the training of laborers from technical training and extension, poverty alleviation and the education of senior school and so on. "The Plans for Constructions of the Exemplary VE Schools and Institutions." According to that plan, the emphasis is to construct 1000 high level exemplary secondary vocational schools and 100 exemplary higher vocational institutions, and promote the capabilities of these schools and institutions to cultivate high quality skilled talents. "The Plan for Enhancing the Quality of VE Teacher." According to that plan, the emphasis is to comprehensively enhance the holistic quality of VE teaching staff. The 2008 plan for enhancing the quality of teachers from secondary vocational school embodies the following two parts: One is about the training of professional backbone teachers. The central government finance supports 6850 such teachers to receive the national level of training, 25 of whom will be selected to be the top and sent for a further advanced study overseas; together with that is the provincial level of training for the professional backbone teachers. The other part is concerned with the fund for the part-time teachers in severe shortage. The central government finance shall continue the support for a batch of secondary VE schools to employ from other walks of life the professional technicians and highly skilled talents to teach part-time faculty. More than those, during the 11th Five-Year Plan, special funds are assigned by the central finance to support the Key National VE Teacher Bases to develop 80 professional teaching educating and training designs, curricula, and textbooks, improve the systems of the programs for teacher educating and training, and meet various levels and models of development and training demands for new teachers, in-service teachers, and principals. All these plans show that the emphasis of VE in China has shifted from the previous paying attention to the scale expansion to the construction of the basic capabilities of VE. For a long time, the VE in China has been weak comparative with other education. The above mentioned four construction plans will make it up and toward a full development.

The Establishment of VE Assistance System for Students in Poverty

The establishment of VE assistance system for students in poverty is the important measure for putting into practice the principle of educational equity and the harmonious development of education. In 2004, the enrolled students in China's secondary VE schools and institutions have reached 13.7 million, of whom quite a number come from poor families and are in urgent need of funding.

In 2005, The Decision of State Council on Pushing the Development of VE Vigorously makes it clear, "to establish VE assistance system for students in poverty. The central and regional finance shall be assigned for funding those students in secondary VE from the poor rural families and the low-income families in the urban areas. The secondary VE schools and institution shall take a proportion of their income and use it as the stipend of scholarship, grant and tuition waiver. At the same time

schools and institutions are encouraged to organize their students to actively participate in work-&- study programs and part-time work as their main means of assisting students. Financial institutions shall load to students in difficulties as an assistance to support for their VE. All regional governments shall include those VE students from poor families in their subsidizing scope of national assistance loan. Through all kinds of different ways to assist such as providing grant, scholarship, and loans, students from poor families and those choosing agricultural or geographical and mineral majors which are hard vocations are to receive a partial or total tuition waiver or a living subsidy." In June, 2007, in accordance with the spirit of the State Council, Financial and Educational Ministries made The Interim Measures for the State Management of Assistance Funds in Secondary VE specifies in clear term that "the subsidizing policy system of secondary VE mainly in the national assistance funds, combined with scholarships set up in schools and institutions, students' work while studying, post probation, and partial and total tuition waiver. The local governments, industries and enterprises and social organizations are encouraged to set up grants and scholarships to support secondary VE schools and institutions, and financial institutions guided to supply loans for students who are engaged in secondary VE." "The state assistance funds shall support those who are full-time rural students in Grade 1 and 2 and officially registered in secondary VE schools and institutions, those who are registered as non-agricultural residents in counties and towns and those from urban families with difficulties." "The subsidizing funds are co-established by the central and local governments, which are mainly used to assist students' living expenditure. The subsidizing standard is ￥1500 for a student per year." The establishment of VE assistance system for students has further embodied the fairness and justness of socialist education. This policy enables more students in poverty to receive VE, empowering them with vocational skills and the capabilities of creating more social wealth and further of sharing the common social benefits, all of which are in favor of the formation of a harmonious society in which each member works to his full capabilities and gets rewarded as he is supposed to (Zhen, 2005).

Conclusion and Recommendation for the Reform on Teaching

Since the reform and opening up, the policies of pushing forward the teaching reform of VE are mainly embodied in the following several important documents. In 1996, Vocational Education Law of the People's Republic of China regulates: "In conducting vocational education, vocational schools and vocational training institutions shall combine education with practice, serve the local economic construction, maintain close ties with enterprises and train practical personnel and skilled workers." In 2002, the Decision of the State Council on Making Great Efforts to Push forward the Reform and Development of Vocational Education clearly put forward: "The vocational schools should closely combine teaching activities with production in practices, service to the society, technology popularization and development, do the same between cultivating vocational abilities and professional ethics, and at the same time, make sure students

have enough time for practice, and receive strict requirements so that can be developed in students the practical abilities, professional skills and dedications, the rigorous and realistic working style. The teaching conditions shall be improved and the construction of bases for conducting experiments and probation shall be strengthened. The co-construction and –operation between vocational schools and the concerned enterprises and public institutions shall be strengthened, making full use the equipment and facilities there to have teaching conducted combined with practices." In 2005, The decision of State Council on Pushing the Development of VE Vigorously notes clearly that VE should take "service as its main purpose and is job-oriented." Deepening the teaching reform is mainly embodied as the following three: Firstly, "in accordance with the demands of market and society, the teaching contents and approaches are to be continuously upgraded." Secondly, it is emphasized "to strengthen the cultivation of VE students' practical abilities and vocational skills and the practical training in the process of teaching." Thirdly, it is stressed "to vigorously put forward models of the combination between work and study and of the co-operation between schools and enterprises so that, with close contacts stablized with enterprises, vocational schools can not only strengthen students probation in practice and gain social experience but also reform the traditional school-and classroom-centered model of talents cultivation establishing a system of enterprises accepting VE students' probation."

From the documents issued to guide the teaching reform on VE, it is evident: Previously the teaching reform only emphasized the teaching in practice and the strengthening between schools and enterprises; currently it has been developed into a comprehensive reform concerning the whole teaching field. Particularly, the establishment of the models of "the combination between work and study and of the co-operation between schools and enterprises" will further promote the overall reform in VE teaching such as in its guiding thoughts, specialty provision, curriculum structure, teaching contents, the means of cultivating and so on.

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Comparative Education-Cultural Research on the Formation of Vocational Views and Values as a Challenge of Vocational Education: Analyses of Vocational Aspirations and Vocational Values for 12th Grade Students in Japan, China, Korea and Indonesia

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ABSTRACT The purpose of this paper was to float up the meaning of the aspect vocational values and vocational education and training or career education for younger generation. Some hearing and questionnaire surveys were implemented in total fifteen high-schools in four countries, Japan, Korea, China and Indonesia from the analytical results of questionnaire survey, especially, from factor analysis concerning students' vocational values. It derived five factors, economical orientation, society orientation, self realization orientation, leader orientation and transcendent existence orientation. Final fifth factor is rather new findings within such a kind of research. Also, from comparison of each factor among countries and schools (general and technical high schools), Japanese and every country's general students commonly face to noticeable challenges for the development of weak and low vocational aspirations and values through career and vocational education.

KEY WORDS Vocational Values, Vocational Choice, Career, Vocational Education, Comparative Survey, Education Culture

Background and Method

This study chose following six countries which have high comparability concerning educational culture, so that the aspect of students' vocational views and values can be clarified convergent and divergent characteristics.

Japan as one case of market economy and vocational values oriented countries, China as one case of developing market and socialistic discipline oriented countries, Korea as one case of market economy and school meritocracy oriented countries, the U.S. as one case of individualism and career guidance oriented countries, Germany as one case of vocational training oriented country and Indonesia as one case of developing and religion oriented countries. In this time, this

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study decided to exclude two western countries, the U.S. America and Germany with time restriction.

So, hearing surveys were implemented during from 2008 August to September in four countries, Japan, Korea, China, and Indonesia prior to questionnaire survey. Semi-structured interview to school teachers in charged of curriculum and career matter; school regular and special test system, guidance system for entering university, guidance system for job placement, students' social service activities, work experience, career learning contents and educational activities for training of vocational views.

Fields are 15 high schools. 4 high schools in Indonesia were participated, 621 school is General HS in Purworejo (Central Java) and 622 school is Technical HS in Purworejo, 623 school is General Islamic HS in Purworejo, 624 school is Technical HS in Semarang. 4 high schools in Japan were participated, 811 school is General HS in Mie Prefecture and 812 school is General HS in Gifu Prefecture, 813 school is General HS in Gifu prefecture, 814 school is Technical HS in Aichi Prefecture. 3 schools in Korea were participated, 821 school is General HS in Daejon, 822 school is Technical HS in Daejon, 823 school is Business commercial HS in Daejon. 4 schools in China were participated, 861 school is General HS in Shanghai and 862school = General HS in Shanghai, 863 school = Technical and Information HS in Shanghai, 864 school = Technical HS in Shanghai.

Questionnaire surveys were implemented in four countries as the second stage. The questionnaire surveys were answered by 1402 students totally who belong to 13 schools (621, 624, 811, 812, 813, 814, 821, 822, 823, 861, 862, 863, 864) parallel to hearings by co-operations of my co-researchers in each country (see Table 1).

Table 1
Detail of Answered Students

	School	M	F	Total
621	IN General	48	69	117
624	IN Technical	67	16	83
811	JP General	49	51	100
812	JP General varied	50	60	110
813	JP General varied	18	48	66
814	JP Technical	116	2	118
821	KR General	60	60	120
822	KR Technical	116	0	116
823	KR Business	0	102	102
861	CN General	53	52	105
862	CN General	60	68	128
863	CN Technical	59	47	106
864	CN Business	52	79	131
	Total	748	654	1402

Complementarily, only one interesting fact should be commented. In general, Asian countries have one kind of commonness in the gender character in education system excluding China. In Indonesia and Japan, there is gender distinction between technical high school and commercial high school. In Korea, there is gender distinction within total education system.

Questions are constructed of 86 items, mainly five components as following matters.

a. Volunteer activity and part time job experiences
b. Present aspirations to higher education and vocational choice
c. Past formation and the time of vocational choice
d. Communication in family regarding employment
e. Meaning to vocation in the future life
g. Values to vocation (22 items for factor analysis)

Recently, especially in Japan, researchers tend to study on vocational choices and values for pupils and students in the relationship to career education, now yet, men succeed to former studies which influenced from the old German psychologist, Spranger (1921), in the US America Ginzberg (1951), Rosenberg (1957) and Super (15 scales in Work Values Inventory, 1970). These studies and Japanese researches always have depended on western culture, not signified varied scales including such aspects as politics, religion or anti-social (post-modern) values.

Also the topic of vocational values has mainly been researched as the matters of psychological issue and not educational concrete activities (curricula), even though in the field of vocational education and training which had only the perspective to vocational knowledge and skills. However, this study report is based on questionnaire survey, and analysis was completed.

Comparison of Career Choice and Vocational Aspiration

By voluntary sampling, so that data was investigated in three home room classes and about one hundred answers in each school (see Table 1).

Experience of Part Time Job and Its Decision Effect

Total number of students who have experienced part time job is not high (37.8%), but Japanese 813 varied career oriented general school (80.6%), 814 technical school (66.7%), Korean 822 technical school (55.3%) and 823 business school (65.3%) are noticeably high. Regarding its effect to students' career decisions, they answered positively in Japan (78.2%) and China (61.7%), but negatively (43.3%) or unclearly (39.5%) in Korea.

Present Career Decision and Occupational Aspiration

At the present moment, totally, round 10% of students have not decided their career after graduation, but comparatively most students would like to enter higher education (66.4%) or employment (24.0%). Characteristic phenomena is while general students tend to choose higher education and vocational students choose to enter employment in Japan and Indonesia, but most students hope to entering higher education in Korean vocational schools (round 75% in 822,823) and Chinese 864 business school (54.1%).

These tendencies are influenced from the development of higher vocational education system in both countries (significant at the level 0.1% by X^2 test).

Table 2
Career Decision for Each School (Q1-10) (%)

School code	Advancement		Employment		Not yet		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
621	96	80.7	9	7.6	14	11.8	119	100.0
624	19	22.6	59	70.2	6	7.1	84	100.0
811	98	98.0	1	1.0	1	1.0	100	100.0
812	69	62.7	39	35.5	2	1.8	110	100.0
813	34	50.7	23	34.3	10	14.9	67	100.0
814	25	21.4	88	75.2	4	3.4	117	100.0
821	113	94.2	4	3.3	3	2.5	120	100.0
822	88	75.9	18	15.5	10	8.6	116	100.0
823	76	74.5	19	18.6	7	6.9	102	100.0
861	89	84.8	5	4.8	11	10.5	105	100.0
862	120	93.8	0	0.0	8	6.3	128	100.0
863	35	33.0	42	39.6	29	27.4	106	100.0
864	72	54.1	30	22.6	31	23.3	133	100.0
Total	934	66.4	337	24.0	136	9.7	1407	100.0

Note. $X^2 = 561.522$, df=24, $p < .001$

Table 3
Occupational Wish for Each School (Q2-1) (%)

School code	Advancement		Employment		Not yet		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
621	94	79.0	4	3.4	21	17.6	119	100.0
624	71	84.5	3	3.6	10	11.9	84	100.0
811	48	48.5	19	19.2	32	32.3	99	100.0
812	75	68.2	14	12.7	21	19.1	110	100.0
813	41	61.2	8	11.9	18	26.9	67	100.0
814	85	72.0	20	16.9	13	11.0	118	100.0
821	91	75.8	6	5.0	23	19.2	120	100.0
822	67	57.8	10	8.6	39	33.6	116	100.0
823	66	64.7	6	5.9	30	29.4	102	100.0
861	50	47.6	27	25.7	28	26.7	105	100.0
862	52	40.6	43	33.6	33	25.8	128	100.0
863	35	32.7	33	30.8	39	36.4	107	100.0
864	40	30.1	41	30.8	52	39.1	133	100.0
Total	815	57.9	234	16.6	359	25.5	1408	100.0

Note. $X^2 = 216.575$, df=24, $p < .001$

Wish to Occupation

As data shows, there are so many students who have not decided their future career after graduation of high school or university (totally round 25%). Especially, Japanese 811 general school (32.3%) and all Chinese school (26-39%) are so noticeably. In these countries, especially Japanese general high school education should be reformed vocationally.

About the reason why they have no desiring occupation, two main causes are driven from their answers. On the one hand, they have not close experience to occupation and work, and they also answered that they can't recognize their aptitudes themselves on the other hand.

One of most interesting topics in this survey is what occupation do they desire to become (free description to Q2-3). Table 4 shows that Korean and Chinese students have varied desires to occupation, but contrastively Japanese students' wishes are comparatively narrow, although few students write their internal worlds. In spite of the fact, Japanese vocational students comparatively tend to secure the relevance between school specialty and occupation.

Table 4
Students' Occupational Wishes

JP 811 gen.	JP 814 tec.	KR 821 gen.	KR 822 tec.	CN 861 gen.	CN 864 bus.
Professor 11	Technical worker 7	Teacher 19	Company worker 6	Physician 3	Sport teacher 14
Teacher 10	Programmer 6	Professor 9	Teacher 5	Lawyer 3	Designer 9
Physician 5	Maintenance 5	Public officer 8	Technician 4	Businessman 3	Businessman 8
Architecture design 5	Electric worker 4	Designer 7	Public officer 4	Teacher 2	Counselor 4
Engineer 5	Engineer 4	Game computer 5	Engineer 4	Diplomat 2	Veterinary etc. 4
Pharmacist 4	Hairdresser 3	Enterpriser 5	Electric engineer 3	Interpreter 2	Journalist 4
Announcer etc 4	Musician 3	Nurse 5	Professor 3	Others 15×1	Office worker 4
Lawyer 3	Researcher 2	Pilot 4	Aircraft maintenance 2		Professor 3
National officer 3	Nursery teacher 2	Singer 4	Architecture 2		IT engineer 3
Company worker 3	Designer 2	Soldier 3	Media 2		Enterpriser 2
Novelist 3	Cooker 2	Policeman 3	Game programmer 2		Lawyer 2
Welfare etc. worker 3	Others 11×1	Announcer 3	Programmer 2		Comedian 2
Accounting, law 2		Other 10×2	Priest 2		Architect Designer 2
Medical specialist 2		Others 20×1	Comedian 2		Richman 2
Musician 2			Cooker 2		Musician 2
Counselor 2			Others 17×1		Diplomat 2
Stewardess 2					Sport professional 2
Others 16×1					Others 27×1

Influence on Students' Choices from Modeled Persons and Effective Events

Next, this study tried to investigate into influences on students' choice from impressive events and person's model. First regarding existence of impressive model for vocational choice, when this study makes cross calculation students who have desiring occupation and their influenced events,

27% students who selected influence from "television program," especially by Korean students go up to 36%.

On the other hand, regarding influenced person, this research prepared 12 selective options, such as parents, brother and sister, grandfather and grandmother, school teacher, friends, boss in part time workshop. Every country's students don't choose every option only a little. Among these options, only parents influenced on students' behaviors (41.9%). However, seriously, Japanese students are so denial to parent's influence (only 26.4%, IN 58.3%, KR 43.6% and CN 48.2%, significant at the level 0.1% by X^2 test, Table 5).

Table 5
Influence from Parents (Q2-6-1)

State	Yes		No		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Indonesia (62)	5	41.7	7	58.3	12	100.0
Japan (81)	106	73.6	38	26.4	144	100.0
Korea (82)	88	56.4	68	43.6	156	100.0
China (86)	144	51.8	134	48.2	278	100.0
Total	343	58.1	247	41.9	590	100.0

Note. X^2=20.285, df=3, $p < .0001$

Meaningful Matter in Student's Lives

10 answer options were prepared such as "state development", "vocational activity", "family happiness", "social service", "religious activity", "pursuit of self interest", "good human relationship", "political participation", "free life", "no idea" so that this study can explore the degree of importance of vocational life among total life career.

Totally, among these options, "state development", "social service" are comparatively selected by few students, "persuade of self interest" and "good human relationship" are signified by more many students.

Not few students (20%) answered as an important activity in future life, but it depends on the higher selective rate of Indonesian students. 811 Japanese GHS, 821 Korean GHS and 861 Chinese GHS are so low. This common Asian phenomenon let us introduce common cooperative research and political measures.

Factor Analysis of Vocational Values

Extraction of Factors and Composition of Scales

In reference to scale constructions and concepts regarding vocational values by Super (1970), Institute of NHK (2004), Odaka (1970), Shein (1978), and etc., 22 questions were developed and tried the exploring factor analysis as shown in the result Table 6. Procedure of the factor analysis is as follows.

○ Estimation of communality: Principal Factor Method
○ Factor rotation: Kaiser's Promax Method (Oblique rotation)
○ Characteristic value (accumulative % of variance) / Sum of squares (accumulative %)
F1: 5.805＝26.384/ 23.837 F2: 2.215＝36.454/ 31.426 F3: 1.485＝43.203/ 35.581
F4: 1.184=48.585/ 38.416 F5: 1.156=53.840/ 40.867 F6: 1.054
F7: 0.909

Table 6
Factor Pattern and Factor Correlations (n=1332)

Scale construction for factor	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Comm unality**	**Mean**	**SD**
Work conditions	.737	-.138	.093	-.047	-.035	.474	1.75	.840
Much money	.638	-.267	.093	.217	-.086	.507	1.85	.842
Means for life	.601	.016	.148	-.144	.033	.356	1.94	.902
Stable employment	.598	.369	-.109	-.084	-.077	.515	1.85	.877
Stable company	.465	.327	-.188	.121	-.018	.467	2.06	.941
Traffic convenience	.387	-.020	-.182	.207	.094	.264	2.34	1.023
Descendant prosperity	.329	.124	.179	-.074	.314	.382	2.36	1.095
Social obligation	-.041	.779	-.023	-.131	.046	.524	2.30	.948
Cooperative working	-.044	.632	-.026	.245	-.134	.495	2.09	.941
Fulfillment of mission	-.018	.451	.143	-.073	.090	.292	2.07	.913
Social appraisal	.012	.357	.168	.284	.029	.444	2.22	.989
Life and safety	.060	.343	.172	-.108	.319	.397	2.30	1.061
Persuade of dream	-.031	-.002	.716	.088	.046	.568	1.76	.925
Self expression	-.058	.317	.488	.001	-.130	.422	2.07	.952
Exercise of ability	-.055	.236	.374	.182	-.058	.353	2.00	.933
Control of staff	-.022	.080	-.014	.635	.062	.456	2.64	1.069
Higher position	.317	-.108	-.004	.534	.098	.525	2.28	1.092
Independent working	.022	-.106	.284	.368	.076	.262	2.19	1.052
Religious doctrine	-.044	-.102	-.061	.083	.702	.444	3.76	1.081
State development	-.092	.318	-.050	.190	.514	.546	2.80	.853
No prospect	-.133	.037	-.168	.071	.011	.037	3.68	1.232
Friendly working	.138	.239	.190	.150	-.241	.259	1.75	1.159
Factor 1	1.000	.397	.239	.534	.167	Econo-mical		
Factor 2	.397	1.000	.490	.468	.403	Society	Orienta-tion	Orienta-tion
Factor 3	.239	.490	1.000	.336	.236	Self		
Factor 4	.534	.468	.336	1.000	.182	Leader	Orienta-tion	
Factor 5	.167	.403	.236	.182	1.000	Transc-endent existen-ce	Orienta-tion	

The Scree-test indicated that five factors were adequate to account for the data. The Exploratory Factor Analysis was employed using principal factor method with Promax rotation (oblique rotation). Five factors were named as follows:

F1 can be named as "Economical orientation," because it is higher value in such variables as "work condition" or "much money" etc. F2 can be named as "Society orientation," because it is higher value in such variables as "social obligation" or "cooperative working." F3 can be named as "Self realization orientation," because "persuade of dream" and "self expression" contribute strongly to it. F4 can be named as "Leader orientation," because "controlling to staff" and "higher position" relate to it. F5 can be named as "Transcendent existence orientation," because the absolute existence, such as religion and state contribute to it. These factors are not especially new, but the fifth, including religious aspect, is quite unique from this study at least. Next, this research composed five scales in which value of item's factor pattern is more than 0.4 so it can acquire the analytical frame work as well as factors. These scales' reliabilities are as follows (number of items).

F: 0.763(5) F2: 0.647(3) F3: 0.628(2) F4: 0.660(2) F5: 0.586(2)

Correlations between each two items are plus and strong a little (F3=.458, F4=.493, F5=.418), although degree of reliabilities are lower and number of items are few.

Analyses

Of course, extracted effective factors are different each other in each country, and therefore this varied relationships was analyzed. This analysis between factor patterns among countries will be tried in other chances.

Here, only one interesting specific topic, comparison among states or schools (whether general or technical) by using five analytical scale are shown. This study shows only two detailed tables (F3 and F4) of results for analysis of variance (F tests) so it can avoid same kind of evidences. In the case of scale 1 (economical orientation) in Figure 1, Indonesia and China are higher than Korea and Japan (significant $<0.1\%$) and Korean and Japanese technical students are stronger than general students economically (significant 0.7%). Indonesia Japan Korea China

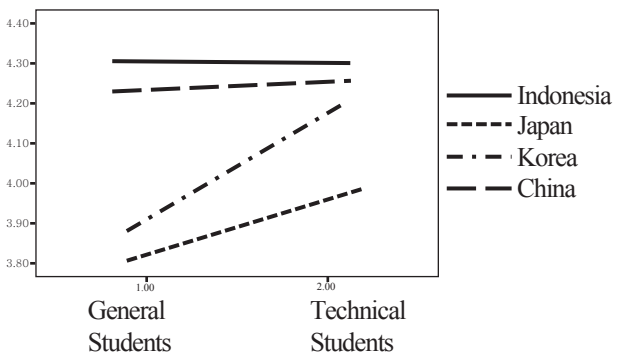

Figure 1. Average Values of RFSF 1

Table 7
Analysis of Variance for F 1

	df	F	P
State	3	20.594	.000*
School	1	7.211	.007*
St.×Sc.	3	2.789	.040*
Error	1068		

Figure 2 (society orientation) shows that Japan and Korea are weaker than Indonesia and China in this scale too (significant ＜0.1%), and only Chinese technical school is higher than general school (totally no significance).

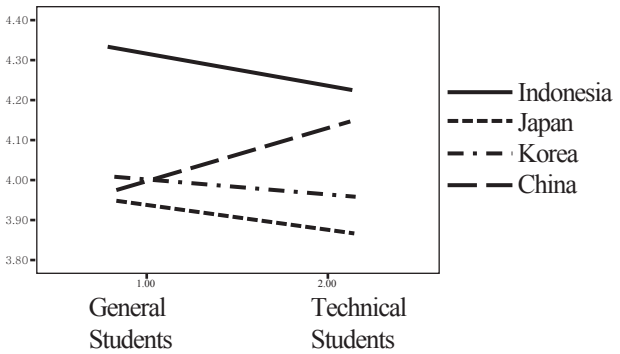

Figure 2. Average Values of RFSF 2

Table 8
Analysis of Variance for F 2

	df	F	P
State	3	10.659	.000*
School	1	.070	.791
St.×Sc.	3	1.274	.282
Error	1068		

In the Figure 3 (self realization orientation), it shows so clear tendencies that Japanese students are here also lower in their motives, Korean students are so strong self realization oriented (significant ＜0.1%) and general students of every countries are strongly higher than vocational ones in the comparison of specialty (significant ＜0.1%). Table 1 in appendix presents average and standard deviation of RFSF3 in each state, and Table 2 in appendix shows the result of RFSF3 Tukey HSD.

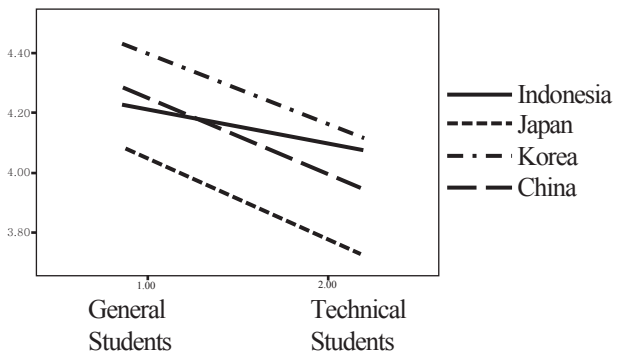

Figure 3. Average Values of RFSF3

Table 9
Analysis of Variance for F3

	df	F	P
State	3	9.662	.000*
School	1	19.458	.000*
St.×Sc.	3	.430	.732
Error	1076		

Figure 4 (leader orientation) also shows that there is a big ditch between Japan (low, significant ＜0.1%) and other three countries and every countries' vocational students are higher than general students (significant ＜0.1%). Table 3 in appendix presents average and standard deviation of RFSF4 in each state, and Table 4 in appendix shows the result of RFSF4 Tukey HSD.

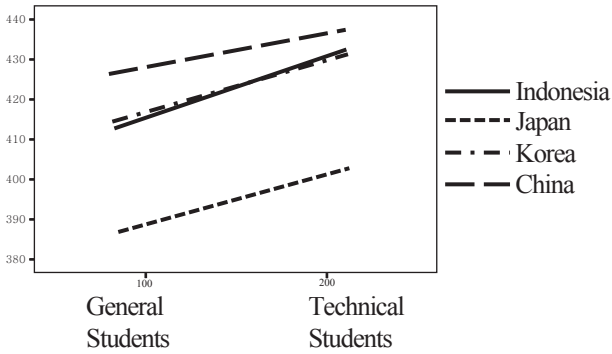

Figure 4. Average Values of RFSF 4

Table 10
Analysis of Variance for F4

	df	F	P
State	3	32.250	.000*
School	1	19.034	.000*
St.×Sc.	3	.288	.834
Error	1075		

Figure 5 (transcendent existence orientation) clearly or naturally shows that Indonesian schools strikingly high in the relation with all other countries.

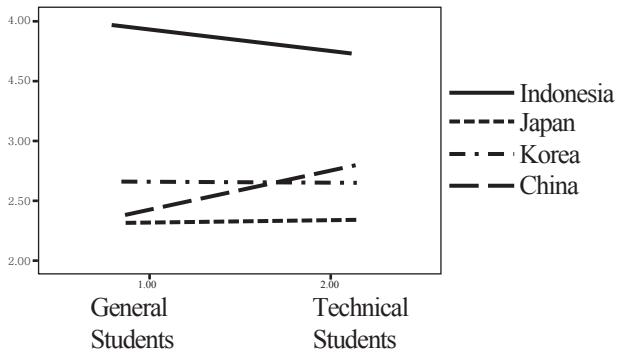

Figure 5. Average Values of RFSF 5

Table 11
Analysis of Variance for F 5

	df	F	P
State	3	123.758	.000*
School	1	.636	.425
St.×Sc.	3	3.434	.016*
Error	1067		

Conclusions

In short, Japanese and every country's general students commonly face to noticeable challenges for the development of weak and low vocational aspirations and value, especially for the reinforcement of economical and management oriented aspects. This is one task of vocational educations to general student. On the other hand, vocational students are generally quite weak in the aspects of social contribution and self realization. In contrast with general students, career guidance and education which stresses on individual career development should be provided.

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Table 1
Average and Standard Deviation of RFSF3 in Each State

State	School	AV	SD	N
Indonesia (62)	1.00	4.2119	.62841	118
	2.00	4.0974	.53827	77
	Total	4.1667	.59566	195
Japan (81)	1.00	4.0455	.86629	99
	2.00	3.7735	.96377	117
	Total	3.8981	.92826	216
Korea (82)	1.00	4.4034	.61506	119
	2.00	4.1551	.70564	216
	Total	4.2433	.68435	335
China (86)	1.00	4.2451	.77952	102
	2.00	3.9936	.88424	236
	Total	4.0695	.86064	338
Total	1.00	4.2340	.72982	438
	2.00	4.0201	.81862	646
	Total	4.1065	.79061	1084

Table 2
RFSF3 Tukey HSD

(I) State	(J) State	(I-J)	S E	P V
Indonesia (62)	81	.2685*	.07656	.003
	82	-.0766	.06981	.691
	86	.0971	.06970	.504
Japan (81)	62	-.2685*	.07656	.003
	82	-.3451*	.06763	.000
	86	-.1714	.06751	.055
Korea (82)	62	.0766	.06981	.691
	81	.3451*	.06763	.000
	86	.1738*	.05975	.019
China (86)	62	-.0971	.06970	.504
	81	.1714	.06751	.055
	82	-.1738*	.05975	.019

Table 3
Average and Standard Deviation of RFSF4 in Each State

State	School	AV	SD	N
Indonesia (62)	1.00	3.5084	.89486	119
	2.00	3.8117	.74356	77
	Total	3.6276	.84977	196
Japan (81)	1.00	2.9745	.88333	98
	2.00	3.2222	.86464	117
	Total	3.1093	.87989	215
Korea (82)	1.00	3.5336	.95831	119
	2.00	3.7963	.86006	216
	Total	3.7030	.90358	335
China (86)	1.00	3.7598	.83171	102
	2.00	3.9234	.84257	235
	total	3.8739	.84143	337
Total	1.00	3.4543	.93445	438
	2.00	3.7403	.87605	645
	Total	3.6247	.91059	1083

Table 4
RFSF 4 Tukey HSD

(I) State	(J) State	(I-J)	SE	PV
Indonesia (62)		.5182*	.08532	.000
	82	-.0754	.07769	.766
	86	-.2463*	.07760	.008
Japan (81)	62	-.5182*	.08532	.000
	82	-.5937*	.07549	.000
	86	-.7646*	.07541	.000
Korea (82)	62	.0754	.07769	.766
	81	.5937*	.07549	.000
	86	-.1709	.06665	.051
China (86)	62	.2463*	.07760	.008
	81	.7646*	.07541	.000
	82	.1709	.06665	.051

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Research and Development of the Curriculum for Secondary Vocational School Teachers' Qualification

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ABSTRACT Based on the empirical analysis of the status quo of VET teacher training in China and on the teachers' expectation on ideal curricula, the authors consider "work process orientation" as a core characteristic of curriculum for teacher's qualification in secondary vocational schools. The authors use the work process-oriented curriculum design methods (GAB and EXWOWO) to develop curricula. In this way, the comprehensive competences and professional tasks of the VET teachers are determined and described, the "Learning-fields" courses and their contents are constructed. Finally, the contribution of this curriculum to the professionalization of VET teachers is discussed.

KEY WORDS VET (Vocation Education and Training) Teacher Training, Work Process Orientation, Curriculum Design Method, Professionalization of VET Teachers

Introduction

The establishment and implementation of the teacher certification system started after the Teachers Law of the PR. China and the Regulating Rules for Teacher Certificate were published in 1993 and 1995 respectively. Currently, compared with those of elementary and general secondary school teachers, the certification system for secondary vocational school (hereinafter as SVS. teachers and the corresponding authentication mechanism still need improving, particularly exhibited in the aspect of lacking explicit regulations and being devoid of uniform relevant qualification standard, which greatly influences the professionalization of the VET teacher's. The study on SVS teachers' qualification and certification is significant for furthering development of VET and promoting the construction of teaching resource. In recent years, the Ministry of Education (MoE) has organized institutions to carry out relevant study extensively, among which includes research and development of Standard Curriculum for Secondary Vocational School Teachers' Qualifications discussed in this paper.

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Core Characteristics of SVS Teachers' Qualification Courses

Currently, the development of VET in China has entered a new stage. In order to improve education quality, vocational schools are striving to solve problems existed in curricula and teaching and learning process systematically, such as promoting the work-based courses, carrying out the action-oriented teaching, etc. The connotation of the role of the teachers is more abundant: they are not only specialists, educators and trainers, but also coaches, human resources developers, student representatives and guardians, which urges new requirements on teacher's qualification. In 2000, MoE has established a VET teacher professional profile in the APEC Central funding project Vocational Teacher Standards and the Formulation Method. According to this profile, the VET teachers should grasp the knowledge which is directly linked to the practice of the application talents, make a systematic analysis and evaluation of the vocational activities and work processes in the related vocational field, have the ability of the curriculum development, make the analysis, evaluation, design and implementation of teaching and learning process in accordance with the law of occupational development, have the basic ability of the VET administration and the public relations handling (Liu, Liu & Zhao, 1999). The Australian-China (Chongqing) Vocational Education and Training Project developed Chongqing Secondary VET Specialty Teacher Competency Standards illustrates competency requirements of the SVS teachers in nine aspects, such as professional ethics and conduct, industry liaison, curriculum design, organization and conduct teaching and learning, assessment, communication and cooperation, occupational health and safety, service to students and welfare management, professional development (Chan, 2007). Other sub-topics of this study further defined the "instructional design, teaching practice, teaching evaluation, vocational guidance, etc.", all together 11 "conduct unit standards" (published on another article). This paper is a follow-up study based on the launch of that.

Illumination of VET Teacher's Training on SVS Teacher's Qualifications Curriculum

The literature analysis shows that problems existing in the major arrangement, curriculum and learning process made the graduate of VET teacher training institutions unable to satisfy the demand of VET practice. These problems are as following: (1) major arrangement is not planned systematically so that it cannot cover all majors in VET; (2) the learning content derivates from "corresponding" specialty subjects (such as engineering), and it's lacking of empirical evidence in VET and in the world of work; (3) strong practicability majors such as cooking are devoid of academic layer; (4) curriculum's arranged by general courses, basic specialty courses and specialty courses, which makes more than 50% of the learning contents have no direct influence on one's occupation development; (5) high level teacher's cultivation programs focus more on macro-problems and pedagogy theories while less on problems in VET practice such as curriculum development and teaching design (UNESCO-UNEVOC, 2005).

Investigators conclude the characters of current VET teacher's training program in

universities as "professionalism", "applicability", "education-orientation", "occupation -orientation" or "closely related with economic development" (Wang & Zhang, 1998). These viewpoints are of some truth, however, are conceptually not sharp, for that: (1) VET teacher hasn't become "profession" for example according to the criteria made by American National Education Association (see the epilogue part); (2) large amounts of other colleges and universities aiming at applied technology are of applicability; (3) education-orientation hasn't shown the differences between VET and general education teacher training; (4) many majors in universities are arranged according to occupation too, such as medicine; (5) the general direction of the higher education reform is to closely relate the economic development.

After studying the current VET teacher's training program in universities and its implementation, it's found that the development of many programs did not rise from the teacher's work practice demand but rise from "corresponding" specialty science, pedagogy and psychology, which are of strong scientific feature. This point can be clearly seen in as the following aspects: (1) learning contents, "the world of work" of this specialty and teacher's work activities have no explicit relation; (2) specialty learning emphasizes systematic and integral discipline, is context-free; (3) teaching and learning practice seldom relates the work situation, and with less reference of work process, it adds difficulty to build an integral understanding of teacher's job for the students, which mostly made the "applicability" of teacher's cultivation impossible to realize (Zhao, 2003). Many teacher training institutions required their students to gain skilled worker certificate, practice learning is simplified as only gaining operation skills, while students have not got basic understanding about the acquisition, analysis and impartation of work knowledge, which reflects the status quo of experiential learning in VET learning theories (Dehnbowstel & Novak, 2000).

The above discussion shows that this study is still in an infant stage on the theories understandings of VET teacher's training and cannot supply enough theoretical basis and experiences to SVS teacher's qualification. Before developing the curriculum, the characters of the teachers' ideal training courses should be analyzed through empirical study.

SVS Teacher's Expectation on Teacher's Qualifications Curriculum

This study has chosen 110 teachers of "Car's Maintenance" and "IT-Technology" from SVSs as samples, and asked them to fill a form according to the training courses they participated and their ideal training courses' characters. Meantime the following three, first level indicators and corresponding second level indicators were designed.

Table 1
Assessment Indicators of Curriculum Characters

Indicators	Second level indicators	Indicators	Second level indicators
Work-oriented	Training courses orients at occupation and occupation task	Discipline-oriented	Training courses orients at engineering technique disciplines
	Theories combines practice in learning		Basic knowledge and specialty ones combine together
	There're skilled workers' work knowledge in the courses		Using mathematics formulae to express specialty knowledge
	Specialty knowledge description serves description of work flow and regulations		Description of specialty knowledge serves explaining natural law
	Learning method is guided by practice, study's goal is to explain "relation of goal and method"		Learning method is guided by cognition; study's goal is to explain "the relation of cause and effect"
Situation-related	Specialty contents are imparted in concrete corporate work situation	Situation-unrelated	Acquired specialty contents can be used directly in corporate production
	Corporate real difficulties are handled during learning		Acquired knowledge can be used in corporate directly even without experience.
	Specialty knowledge includes practice experience of corporate production		Abstract attitude toward specialty knowledge
	Specialty knowledge relates occupation greatly		Wide scale of leaning, hard to learn
	It's good to promote the realization of utility function of vocational education		Beneficial to realize the goal of cognizance ability in general education
Application skills oriented	Improving the ability to finish the task with plan in work process	Engineer technique oriented	Improving the ability to design and develop product (project) with plan
	Helping achieve the plan of the task of practicability, implement and assess ability's development		Promoting the development of technical exploitation and design ability
	Including knowledge and suggestions of choosing different solutions		Boosting the development of research ability
	Including knowledge of corporate work and work organization		Advancing the development of creativity
	Improving ability in analysis, utilization and evaluation of technique system, the aim of research is to set work strategies.		Gaining ability to explain the natural order, the aim of research is to design technique system

Every teacher finished two forms according to existed training courses and their ideal ones. The assessment results fall into five levels from zero to four. (Zero stands for totally discordance, and four is for totally accordance.) Table 1 is the description of average assessment results of two professional teachers.

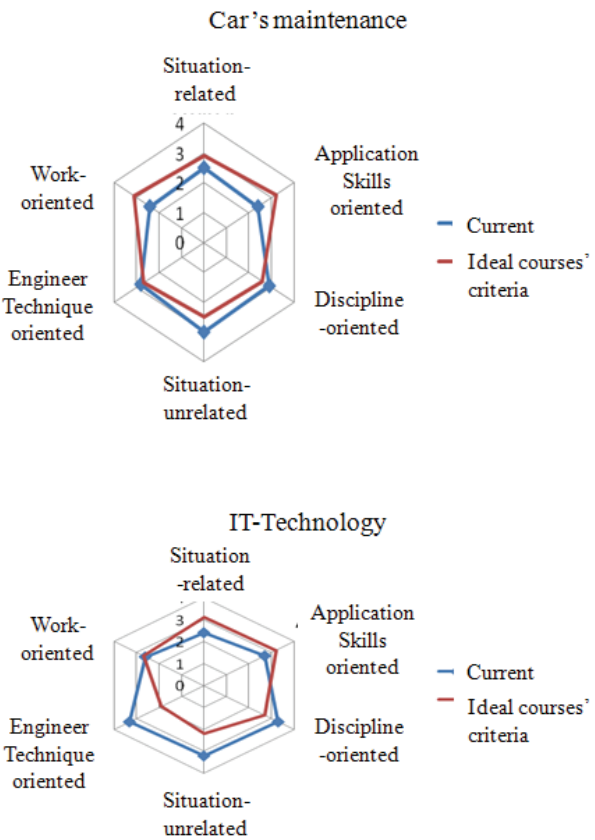

Figure 1. Comparison between Current Courses and Ideal Ones

It can be seen in chart 1 describing Car's Maintenance major that the polygon illustrating the characters of two kinds of courses mostly overlaps, which illuminates teachers' satisfaction with current courses or the absence of clear assumption of ideal courses in their mind. However, the data also states that, current courses focus on discipline, while ideal ones should relate work closer. This is obvious in first-level indicator of "wok-oriented" and "applying techniques-oriented". But the polygon showing two types of courses of IT-Technology has less overlapping sides than that of Car's Maintenance, which accounts for teacher's dissatisfaction with current courses or their assumption towards ideal courses. It's recognized deeply that "current courses are disciplinarily, and ideal ones should be closer to work", although there's no obvious distinction in the aspect of the indicator "work-oriented", which might be resulted from

insensibility between theories and practice learning in this major.

It's investigated that curriculum and teaching reforms have been carried out in some teacher's training institutions in recent years, but these reforms posited mainly in selecting, adjusting and rearranging the discipline content; currently, extensive criticize on "discipline systematization" courses in VET still has not lead the teacher's training institutions studying VET learning theories that are relevant with work process and developing corresponding raining courses. Data reads most of the interviewed teachers thought engineering subjects should take a large proportion in ideal courses on one hand, and they also realized that ideal courses should be related to work on the other hand, which explained that these teachers still locate their occupation as "semi-engineer" without realizing their unique roles, what's more, it's found that a huge gap exists between their occupation ideals and the reality for that they found it cannot dovetail this half-baked role as "semi-engineer" with their own ideal of "professionalization location". Owing to teachers have realized the importance of relating professional development with work practice, therefore several propositions are suggested directly of indirectly, including the necessity of teacher's training relating tightly with work process (work process relativity), the requirement of courses being able to "combine the learning and work", and the proposition that SVS teachers should possess the knowledge of work process.

According to the above analysis of the VET teacher's training status and the characters of their ideal training courses, the core character should be as the following: curriculum being closely relevant with work process that should combines leaning and work, vocational activities and professional knowledge. Such a result not only lines up with the international trend of cultivating VET teacher, but also becomes the important guide of this paper (Grollmann & Rauner, 2007).

Development of the Work-Based SVS Teachers' Qualifications Curriculum

The core task of SVS teacher's qualification curriculum is to "enable learners to work in accordance with development demand of technique, economy and society as well as with demand of his / her own occupation and personal development", thus the main learning contents of the courses are "how to work for education work". "Work" here is not an abstract conception but a series of concrete actions that can be operated, learned and taught, it belongs to professional task of paradigm teacher's occupation that is gained through systematic qualification research. Ideal curriculum should be closely related with work process. It reflects the demands of teacher's work world and follows the vocational development logistics. In this research, this research develops these curricula according to the following figure 2.

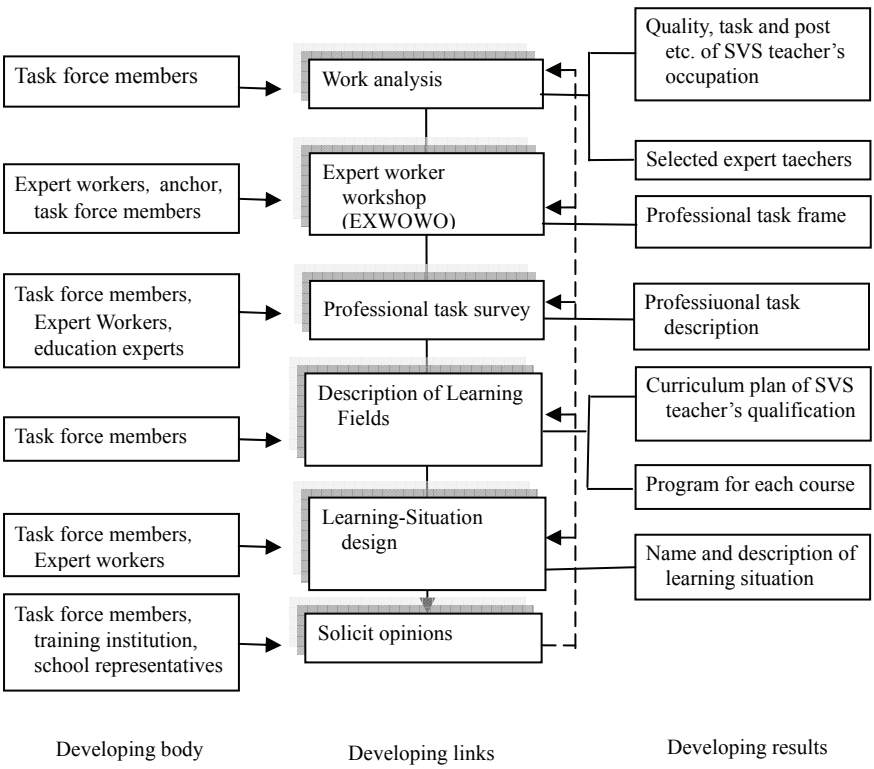

Figure 2. Flow Chart of Developing SVS Teacher's Certificate Curriculum

The following aspects:

(1) Set the cultivation goals of the development of comprehensive action competence.

In training courses, teachers not only impart factual specialty knowledge, but also put the learners in a work situation at best to help them learn "how to work." The curriculum aims not only at teaching skills, but also at developing "comprehensive action competence", i.e. to cultivate the learners' competence to achieve integral teaching task. The courses accentuate the process, relation and situation of learning and competence development. The cultivation goal emphasizes that the learners should "master the basic theories and specialized knowledge in this domain, particularly the work process knowledge and work experience that are directly relating with occupation practice; master basic theories of VET, be capable of occupation analyzing of this domain; be able to analyze, design, implement and evaluate VET teaching and learning process; solve independently unconventional complex problems in line with the changing work world".

(2) Applying the methods of professional task analysis to decide courses

Qualified teachers have competency and work experience, which need them trying systematically to finish teacher's professional task. This study applies integral method of GAB (Berufliche Aufgabe) that is based on work process to understand the connotation the teacher's occupation. Expert Worker Workshops (EXWOWO) has been held in Wuhan and other cities. The professional task analysis is carried out with following steps: a) selection of participants according to the criteria of expert teachers; b) implementation of pro seminars with the expert teachers; c) definition of 3-5 stages of the professional development; d) finding 4-5 representative and challenged tasks of each stage; e) concluding a professional task frame; f) describing the professional tasks and depicting the concrete contents of the professional tasks (Kleiner, Rauner, Reinhold & Roeben, 2002; Zhao, 2009). Eleven courses are determined in this research, they are: "introductions to VET, curriculum design, design and implementation of teaching and learning, assessment, development of teaching and learning materials, design of training venue, establishment and implementation of training plan, issues on psychology and sociology in VET, service to students and welfare management, public relations, and vocational guidance."

(3) Constructing curriculum of Learning-fields

In this curriculum, contents of each course are transferred from professional task as "Learning-fields" with integration of theories and practice, which contains the all contents of a "work," such as objects, tools, methods, work organization and work requirements. Through study in a Learning-field, learners can finish any one of the professional tasks of SVS teacher, and handle any one of the "problem situations"; through learning in all fields the learners can obtain the qualification of being a SVS teacher so as to build a direct connection among "work requirements," "qualification," and "learning contents." Table 2 shows the course of "Development of Teaching and Learning Materials" (hereinafter as TLM).

Reflecting the work contents and requirements preferably, this curriculum can advance the development of learners' action competency effectively. Compared with traditional VET teacher training courses, it embraces the following features: (1) strengthening the development of key competences when developing vocational qualifications; (2) obtaining professional development potential when catering the requirements of the post; (3) learning the professional task contents that come from practice; (4) accomplishing the whole action process from information, plan, implementing to evaluation, learners think and study in intact actions for that the learning should be integral with work process. Such a curriculum links directly curriculum and SVS teachers' tasks and work process, which not only realizes the integration of trans-subject learning and theories and practice, but also boosts the development of learners' cognizance ability and the establishing the sense of occupational identity. Learners might achieve the unification of knowledge and skills, process and methods, and emotional attitude and values learning through integral understanding and introspection on the learning task, process and environment.

Table 2
Curriculum of "Development of Teaching and Learning Material"

Course's Name：Development of Teaching and Learning Materials
Suggested Periods：60 hs.

Description of professional task
After deciding the teaching implementation plan, teachers definitude and trim and analyze the needed TLM, and then decide which need adapting or second developing. For those need developing, the developing requirements should be stated, such as application subject, aim, location, method, ways of representation and technique standards etc., the relevant characters of the application subject and development conditions. If independent development cannot be carried out, teachers cooperate with other teachers or corporations experts.
After nailing down development requirements, teacher decides the ways of presentation (such as paper materials or integral materials) and concrete requirements, if necessary, he/she can turn to professionalized technique personnel; teacher designs and chooses learning contents and poses spare plan and confirmed plan then to realize the plan with certain technique and source according to requirements of application goal and subjects of the TLM. When assessing the made TLM from a scientific, teaching and technique point of view, the teacher tryout it and improve it. During development, teaching ideas should be reflected, and efficiency and benefit should be emphasized.

Learning goal
Learners should be able to make sure the TLM needed developing, to analyze the requirements and conditions of TLM's developing, to set down designing plan of the TLM, to apply the software or tools making TLM, to assess and improve the TLM, and to communicate with relevant personnel in the aspect of intellectual property protection. The concrete requirements are as following:
1, making common electronic courseware and resource (such as Word, PPT, Flash and Mind maps etc.); 2, making electronic courseware and resource which are based on professional software; 3, developing simple web courseware and resources; 4, developing materials for project teaching.

Work and learning contents（Abstract）

Objects	**Tools**	**Work requirements**
knowing the TLM' developing task knowing the developing requirements and the teaching ideas needed reflecting organizing a developing team constructing developing environment	implementation plan of curriculum (or curriculum modules) every kind of teaching references developed TLM **Methods** systematic method of TLM developing **Work organization** undertaking the TLM developing task from relevant department, or developing the TLM after finishing the teaching design forming a team with other teachers, experts or software producer when necessary	the developing TLM reflecting the teaching ideas in curriculum plan; TLM satisfying the developing demands in curriculum plan; TLM tallying with characters of scientificalness, tuitionality, artistry and technicality.

About the Professionalization of VET Teachers – Epilogue

Techniques and social development impose higher and higher demand on the quality of VET teachers. Since 1980s people have realized that one of the effective methods to improve the teacher's status is professionalization. It's a consensus to realize the professionalization of the VET teachers in many countries particularly the industrialized ones. The professionalization means a process of occupational behavior's transition to recognized high professionalization by the society. In western world, discussion on such

a topic dated back to 1950s. For example, America National Education Association holds that there are eight indicators of a profession including with high intellectual activity, with special area of knowledge, with special vocational training, with continuous on-job further study and wholesome specialty organization etc. (National Education Association, 1948); E. Holyle advances that profession should be with ten functions in which includes undertaking significant social function and absorbing systematic knowledge etc. (Hoyle & Megary, 1980). Generally, whether with special education and training or not, whether has profound and unique specialty knowledge and skills, whether carrying out specialized social activities and so on, are considered as important indices to assess whether an occupation could be a profession.

Historically, the teacher's professionalization of Chinese VET has developed with the form and development of teaching source in vocational school education. In 1904, the Qing government published Petition for Permit of the Statue of Industry Faculty-men College, and stipulated how to cultivate the vocational school teachers with different levels and areas, which set the base of forming the teaching resource and professionalizing the teaching job. Huang (1878-1965), the famous Chinese educator, has required VET teachers to participate in public and political activities and to reform the tradition of disengagement from labor and social life. This move made teacher's job description go beyond the scale of "teaching the knowledge and skills" as well as advance more precise demand in the aspect of participating in shaping the development of the society (Li, 1994).

Currently, many hindrances still exist in the professionalization process of VET teachers, such as low approbatory degree from the whole society, lacking political influential VET teacher's organization, imperfection of the teacher management system and absence of authoritative and standard appointment certificate threshold. However, many part-time teachers tide into the schools, which challenges denies even the professionalization of VET teachers to some degree at the same time with reinforcing the practicability of the vocational school education.

Different savants advocate different methods to the way of professionalization of VET teachers. Bonz accents on the understanding and strengthening of VET atmosphere and education process and only based on which the teachers can design the teaching situation and teaching process with high quality (Bonz, 1995); while Zabeck focuses on the ability of combining the education ideas and specialty with pedagogic knowledge and skills (Zabeck, 1992). In our opinion, the base of the professionalization of the VET teachers lies in bringing in and implementing systematic specialized training courses that are co-operative with relevant major subjects and corresponding with teacher's professional task. The study in the article is a beneficial try in this aspect.

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A Case Study of the STS Teaching Strategy and Pattern in Application for the Project Based Learning in Technological and Vocational Education

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ABSTRACT The study aimed on using Science Technology Society (STS) to raise the students' self-creation, and Project Based Learning (PBL) to ponder the problem solving ability. The curriculum implementation of the research includes the concept of physics, biology, chemistry, geosciences, and environment ecology. All the advantages hope affiliate science and technology development for the national economy and promote the whole competitive ability. However, the fast vicissitude technology not only impact the sociality culture, the individual life and the environment ecology but also the public subjects, the various labors, business, management, design, the humanities, etc. The students carry on the discussion to promote the equilibrium development of the science, technology and the humanities. Moreover, in the classroom this study invited the experts to hold the seminars, and take advantages of this stimulation for the students to understand a variety of the related domains.

KEY WORDS Science-Technology-Society (STS), Project Based Learning (PBL), Technological and Vocational Education

Introduction

In the rapidly change with the society, by the time of industry age in changing the information age to the science and technology age, the all of schools authority must comply with the vicissitudes of time, and must be cultivated the raise study. Lives lie under the high tech ages and should have the solution problem and the critical of the ability. On the current, people are facing fast changing and various culture in the society, the independent thinking is also the separation discipline pattern, has been insufficient to satisfy the people in the life and the work need, but causes multi disciplines (multi-disciplinary) or integrating of the branch of technology (inter- disciplinary) curriculum are taken.

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In the last 20 years, the teaching strategy of the Science-Technology-Society (STS) or the program of the STS that has becomes a new instructional model for the school curriculum in the English and the United States. Therefore, for complying with social fast rapid, the project based learning (PBL) in general education curriculum also has to defer the current social pulsation to have been changed.

In the instructional vision of the STS (Science-Technology-Society), emphasized study of the science and technology which can mutually unify with the social subjects and issues, leads the student to the beginning to penetrate subject of the life beginning of for the study, trains the student to create pondered and solves ability of the problems. In addition, the STS program advocated development of the personal experience of life and the social inspire with individual the initiation study (Wei, 1998), and cultivates the student to understand on own initiative the science, technology, and society within three interactions relations, and the understanding science to the science and technology the influence which create to the society, then will be connected with the knowledge to be able into the life. The purpose of this study is for the exploring and discussing: the different variable student originates, passes in the STS's curriculum of the general education based on the instructional strategy and model, whether presents reveals the difference.

The goal of the curriculum of Science-Technology-Society (STS) is to provide means of communication within as wide of a spectrum of the STS community as possible. This includes faculty and students from sciences, engineering/technology, the humanities, and social science in the newly emerging groups on university and college campuses, and in the higher education systems, all of which teach integrative STS subject matters. It also includes professionals in government, industry and universities, ranging from philosophers and historians of science to social scientists concerned with the effects of science and technology, scientists and engineers involved with the study and policy-making of their own craft, and the concerned general leader. A case study impacts of science and technology in their respected fields, the public interest in the groups and the attentive public societies in Technological and Vocational Education.

The scope of Science-Technology-Society (STS) is that value in STS pedagogy at eleven the university levels. Such materials can include original articles describing research or reflection on STS topics. The curriculum emphasizes articles of general interest in the STS-field, which can be used in teaching undergraduate students. Educational modules are suitable for instruction in STS courses at the college level. Appropriate subjects include:

1. The introduction to the place of Science-Technology- Society (STS)
2. The Social History of Science and Technology
3. Philosophy of Science and Technology
4. The effect with of the Science, Technology, and Polices
5. Religion and Socio-Technical Culture
6. Impact of modern Science, Technology, and Human Values
7. Critical Issues in Science, Technology, and Society
8. Environmental Pollution and Conservation

9. Energy Usage and Resource Management
10. Biomedical and Engineering Ethics
11. Information and Media Technologies

Review of the Literature

Taiwanese Education in Development Present Situation

“The general education” is one kind of establishing person's main idea and with the object study for mutually relations in education, in other words is one kind completes “open liberation in the person” education. In recent years, Taiwan universities and colleges gradually took to pass will know the general education, especially since 1996 academic school years got up. The most of universities and colleges have spirited the big research methods in abundance respectively, and they will plan and implement various campuses to pass knowledge the curriculum of general education.

The goal of Taiwan higher general education is not only for the competency of the worker and the producer who have the ability in the raise after graduating, but also for raising understands the life, the understanding life knowledge individual contribution. Therefore, the essence of the general education to have the integrity, the organization sense also can stand in the objective standpoint ponder question, performs the knowledge and the truth the conformity the education. How the STS idea, the teaching strategy and the pattern application in other education, will provide future passes a knowledge that is feasible directive in the practice and the realization higher education, quite will have necessity of the research.

Definition and Connotation of the STS

The Science-Technology-Society (STS) mainly is studying in the subjects of the technology and society which are in regarding with the study issues into in the STS curriculum, penetrates the associates to cooperative learning, the collection teaching materials, the role acting presenting, with the communication coordinated in cooperation study, the study science concept, cultivates in raising the student’s scientific accomplishment (Scientific Literacy) and the ability of problem solution. The synthesis overseas scholar’s argument, thought the STS curriculum to the science education goal are: (1) the student can study the knowledge which in the life needs, and will prepare for the future life; (2) taught the student processes about problems of the science and technology and the society; (3) confirmed and cultivate in raising the student solves when the STS problem must study or have the knowledge and skills; (4) design up the plan blueprint, making up the students to understand the future occupation will need the knowledge and skills.

According to the Taiwan scholar's definition, the STS is taken the student experience of life related society subject as a core courses, to train the student to be able to be positive action in the activities of the STS issues, and by in procession for the problem solution, to obtain as a kind of educational model which the knowledge and the

ability grows.

The STS teaching connotation, according to studies the findings, taken the STS course students who have more positive in the concept, the process skills, the attitude, the creativity and application and so on at the five domains all surpasses the student which accepts the traditional teaching.

The STS Instructional Strategy and the Model

The STS curriculum contains the construction model, the hawk posture model, the problem solution, the role acting presenting, the story talking model, the association cooperation teaching in the strategy. In addition, based on many STS expert and scholar's in the pattern overhead construction, the researcher collects and puts on the Figure 1.

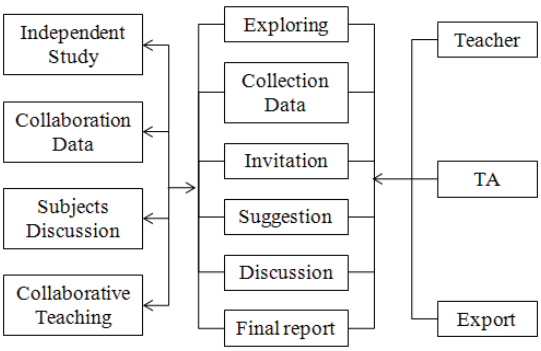

Figure 1. The Instructional Strategy and Model of the STS Curriculum in General Education in National Yunlin University of Science and Technology

The STS curriculum presents the core course in main axle way, also focuses on the question. “The question research” is in a way of the cross discipline organization; furthermore, it develops the team cooperation to solve the problem idea together. When student when listens attentively has other specialized knowledge background schoolmate discussions, the affiliation by argues, the discussion activities, absorbs others’ knowledge and the experiences, opens individual ideas with to take more attendances in the environment concern. When this, penetrates the teacher, the teaching assistant, and the expert of industry teaching and discussion, initiates the student to understand the current social environment development the tendency, then will stockpile the student to locate the problem solution and the independent thinking ability which in the future environment will be supposed to have.

Project Based Learning (PBL)

Project Based Learning allows teachers to create tasks whose complexity and openness mimic problems in the real world. Students can see the interdisciplinary nature of these tasks, and see that each task may have more than one solution. Students who have the

freedom to choose different strategies and approaches may become more engaged in the learning process, and these students will be more likely to approach other problems with an open mind.

In research conducted by the Auto Desk Foundation, teachers from the schools agreed that PBL exhibited similar characteristics:

1. Students make decisions within a prescribed framework.
2. There's a problem or challenge without a predetermined solution.
3. Students design the process for reaching a solution.
4. Students are responsible for accessing and managing the information they gather.
5. Evaluation takes place continuously.
6. Students regularly reflect on what they're doing.
7. A final product (not necessarily material) is produced and is evaluated for quality.
8. The classroom has an atmosphere that tolerates error and change.

In addition, students who are involved in creating the project assignment or the project checklist gain valuable experience in setting their own goals and standards of excellence. This gives students a sense of ownership and control over their own learning. Learners have the added opportunity to identify related sub-topics and explore them in a project based scenario. Teaching with the project based method enables students to work cooperatively with peers and mentors in a student-centered environment where learners are encouraged to explore various topics of interfaces.

Generally speaking, students engaged in a project have some choice in deciding what they will work on, plan their own project, participate in defining criteria and rubrics to assess their project to solve problems they encounter while working on their project and make some sort of presentation of their project.

The project-based learning approach creates a "constructivist" learning environment in which students construct their own knowledge. Whereas in the "old school" model the teacher was the task master in the "new school" model the teacher becomes the facilitator. Current literature on educational reform identifies a number of important qualities of improved learning that schools should strive to achieve. Over the past decade, this study has visited and observed numerous school and classroom Web sites, and have talked to countless students and teachers who have conducted online projects. This study is struck with the large number of similarities in the experiences of their students to what educational reform literature says they should be experiencing. Research studies are also pointing to the efficacy of networked Project-Based Learning activities. This section briefly describes some characteristics of improved learning taken from the reform literature, with commentary taken from our observations and conversations with teachers and students regarding their Net PBL experience.

Here is one practical example as following. The first, at Mie University and Kogakkan University in Mie, the college students have created their digital stories in Project Based Learning for a few years. This study has focused on creating a story on the theme "Motttainai (That's a waste or Wastefulness)" within 90 seconds in Susono's Educational Technology classes for future teachers. The students were able to produce

their digital and other stories collaboratively and learned a lot concerning the theme through creating storytelling. After creating their stories, they were able to use a web forum in the "Moodle" to show their stories to the classmates and to communicate with them (Hitoshi Susono, Tsutomu Shimomura, Ai Kagami, Japan Eri Ono).

In conclusion, projects that have depth, duration, and complexity will challenge students and motivate them towards construction of knowledge. They will acquire problem-solving, communication, collaboration, planning, and self- evaluation skills. After completing a project, ask students to create a self-evaluation of the project. This enables the students to focus on their learning process and allows them to see their progress. Self-evaluation gives students a sense of accomplishment and further instills responsibility for learning.

Learners who can see the connection between a project-based task and the real world will be more motivated to understand and solve the problem at hand. Students enjoy learning when learning makes sense. Project Based Learning lends itself to many disciplines. It provides learners the opportunity to have a voice in how and what they learn, while building intrinsic motivation towards problem-solving.

Method

Demographic Characteristics

This study from independent variable is STS passes knows the curriculum to the class student's individual basic information, including: the gender, the age, the study in college, the educational system, the grade, and the department are and so on five sub-items. According to dependent variable contains among the target includes: Teachers' instruction, Experts' speech, TAs' teaching, Students' self-study in National Yunlin University of Science and Technology. It's at the degree of satisfaction.

Sampling

This purpose of the study was in the understanding different students, passes in STS knows the curriculum teaching strategy and the pattern, whether presents reveals the different results.

This objective study of the student who attend the STS class at the first semester academic in National Yunlin University of Science and Technology, its student originates for four-year and two-year technical college, because the class and grade population is limited. Therefore, the total of 85 students in the STS class who participated this survey in the STS class, and return-ration the percent of 100%.

Instrumentation

This research instrument was developed in arranging "the degree of satisfaction of the STS teaching strategy and the pattern" in National Yunlin University of Science and Technology. In order to realize the validity, the process of development questionnaires divides into four parts: (1) Initially plans to design the questionnaires; (2) Expert

evaluations and comments for the validity; (3) Developed the final formal questionnaires. With the survey divides into three parts of the STS teaching strategy and the pattern, respectively is the student basic information, the degree of satisfaction of the STS teaching strategy, the student self-study result. It had divided into three stratification planes in the STS teaching strategy and the pattern to discuss, respectively be the teachers' instruction, the TAs' teaching and the experts' speech on the total of 38 items by the Likert 5 scoring.

Results and Discussions

The Findings and Discussions of the Quantitative Research

Based on the teaching model of the first semester academic in National Yunlin University of Science and Technology that focus on the main factors are as well as the teachers' instruction, the experts' speech, the TAs' teaching, and the students' self-study results.

Reliability analysis: Respectively divides the distribution of internal uniform reliability (Cronbach alpha) the value to be situated between .9002 and .9404 (Table 1), demonstrated this meter preliminary test each minute meter internal reliability is extremely good, but the overall reliability value is be in .9734.

Table 1
The Respectively is Divided the Sub-items and the Overall of Reliability Analysis

Factor	Reliability
Teachers' instruction	.939
Experts' speech	.900
TAs' teaching	.942
Students' self-study result	.940
Overall Reliability	.973

Note. N=85

Validity analysis: By the way of the confirmation analysis, car rises on the test question is perpendicular to the revolution axis, the extract four factors integers, obtains various load factors > .5 (for example : Table 2), the representative interrogates the volume each construction present to be good. Note: T1-T10 represents the teachers' instruction, P1-P8 represents the experts' speech, TA1-TA11 represents the TAs' teaching, LS1-~LS9 represents the students' self-study result.

Table 2
Distribution of Load Factor

Teachers instruction		**Experts speech**		**TAs' teaching**		**Students' self-study result**	
T1	.671	P1	.850	TA1	.840	LS1	.809
T2	.862	P2	.673	TA2	.813	LS2	.875
T3	.883	P3	.716	TA3	.866	LS3	.822
T4	.620	P4	.652	TA4	.873	LS4	.757
T5	.778	P5	.829	TA5	.863	LS5	.807
T6	.830	P6	.741	TA6	.759	LS6	.858
T7	.794	P7	.787	TA7	.797	LS7	.858
T8	.857	P8	.890	TA8	.753	LS8	.859
T9	.854			TA9	.799	LS9	.794
T10	.899			TA10	.615		
				TA11	.855		

Note. Various Load Factors > .5

The Basic Information of Teachers

Gender: There are eighty-four male students on the percent of 96%, four female students on the percent of 4% in taking the STS class. The result is shown in Figure 2.

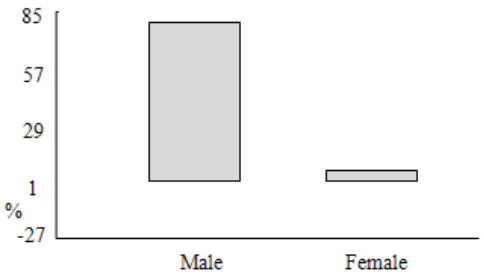

Figure 2. The Chart of Student in Gender

College: The mostly of sixty-eight students in the College of Engineering (CE) are on the percent of 80%, eleven students in the College of Management (MG) are on the percent of 13.2%, three students in the College of Design (CD) is on the percent of 3.4%, three students in the College of Sciences and Humanities (SH) is on the percent of 3.4% in taking the STS class. The result is shown in Figure 3.

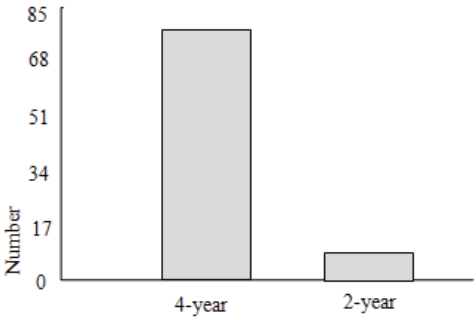

Figure 3. The Chart of Student in College

Educational system: There are seventy-five students of four year in Technical College educational system on the percent of 88%, and ten students of two year in Technical College educational system is on the percent of 12% in taking the STS class. The result is shown in Figure 4.

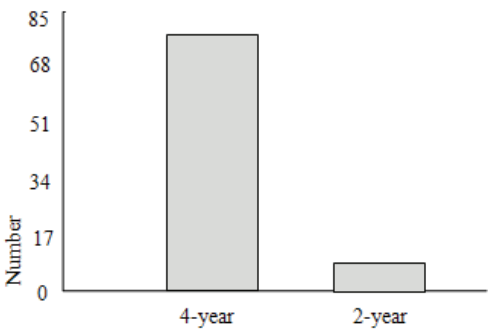

Figure 4. The Chart of Education System

Grade: There are fifty-eight sophomore students on the percent of 68%, twenty-four junior students on the percent of 28%, three senior students on the percent of 4% in taking the STS class. The result is shown in Figure 5.

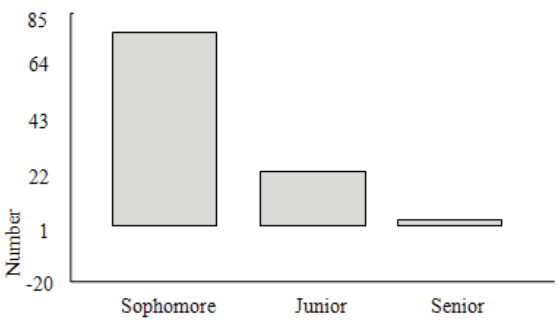

Figure 5. The Chart of Student in the Grade

Department: There are thirty-four students in the Department of Electrical Engineering (EE) on the percent of 40% including twenty-four students in the Department of Mechanical Engineering (ME) on the percent of 28%, ten students in the Department of Information Management (IM) on the percent of 12%, eight students in the Department of Chemistry Engineering (CE) on the percent of 8%. The chart of student in grade and one student in the Department and three students in the Department of Architecture and Interior Design (AID), Applied Foreign Languages (AFL), and Environment and Safety Engineering(ESE) on the percent of 4% in taking the STS class. The result is shown in Figure 6.

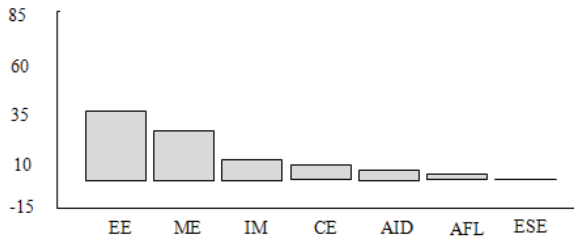

Figure 6. The Chart of Student in Department

The STS Teaching Strategy and Pattern of Variant Analysis

Based on the basic information of participants, the educational system, the grade, the department are as Independent Variable (IV), regarding the teacher instruction, the expert speech, the TA teaching, and the student self-study potency for dependent variable, taking on the One-Way ANOVA analysis, then again taking on the Scheffe test in the multiple comparison, with tests between each other to reveal the difference, understood the different Independent Variable (IV) to respectively depends on Dependent Variable (DV) in the between difference. (1) The STS class students regarding the degree of satisfaction of the teacher instruction on majority of the overall mean score is 4.08, therefore, the STS class students to the teacher instruction presented higher degree of satisfaction. The results are shown in Table 3.

Table 3
The STS Class Students in Degree of Satisfaction to the Teachers' Instruction

Teachers' instruction	M	SD
You can mean attentively to the teacher design the STS course content and the activity in the satisfactory situation.	3.76	.831
You can mean to the teacher familiar with and understand the STS teaching material content in the satisfactory situation.	3.88	.833
You can mean specifically to the teacher explicitly explain the STS teaching subject and the content in the satisfactory situation.	3.88	.971
You can mean nimbly to the teacher utilize the innovation teaching method, promotes the student to study the interest in the satisfactory situation.	3.52	.918
You can mean to the teacher penetrated the Internet of File Transfer Protocol (FTP) on to pass on way and so on material provide course content it in the satisfactory situation.	3.76	.970
You can mean to the teacher penetrated way and so on in Internet or e-mail to establish the teachers and students with interaction on the pattern in the satisfactory situation.	3.36	.810
You can mean to the teacher inspired the students independent thinking and the analysis ability in the satisfactory situation.	3.88	.881
You can mean to the teacher to teaching of kinetic energy full display the teacher Q/A the good interaction relations in the satisfactory situation.	4.08	.996
You can mean to the teacher utilized the different teaching strategy to promote the students in studying the motive in the satisfactory situation.	3.64	.952
Overall, you can mean to the teacher held on the STS curriculum its "Teachers' instruction" in the degree of satisfaction.	4.08	.954

(2) The STS class students regarding the degree of satisfaction of the TA teaching on majority of the overall mean score is 3.76, therefore, the STS class students to the TA teaching presented high degree of satisfaction. The results are shown in Table 4.

Table 4
The STS Class Students in Degree of Satisfaction to the TAs' Teaching

TAs' teaching	M	SD
You can mean to the TA arranged suitableness to the group	3.44	.768
You can mean to the TA suitably arranged to the group discussion with the place in the satisfactory situation.	3.60	.707
You can mean to the TA lead the students in carry on the group discussion in the satisfactory situation.	3.84	.800
You can mean to the TA choose the STS subjects and initiate the student to participate in the discussion in the satisfactory situation.	3.92	.862
You can mean to the TA has clearly understood the student discusses the process and the content in the satisfactory situation	3.80	.816
You can mean to the TA has understood the student's in discussion process study condition in the satisfactory situation.	3.76	.879
You can mean to the TA matched the professor in the STS curriculum and the appropriate coordination in the satisfactory situation.	3.96	.840
You can mean to the TA detailed critique to the students' report and to give the constructive feedback responses in the satisfactory situation.	3.88	.832
In the STS curriculum, you can mean in arranging the Teaching Assistant (TA) to lead each group of discussions in the satisfactory situation	3.48	1.04
You are willing to hold the position of the Teaching Assistant (TA) to study the wish in the satisfactory situation.	4.04	.789
Overall, you can mean to the TA held on the STS curriculum its "TAs' teaching " in the degree of satisfaction	3.76	1.01

(3) The STS class students regarding the degree of satisfaction of the expert speech on majority of the overall mean score is 3.88, therefore, the STS class students to the expert speech presented high degree of satisfaction. The results are shown in Table 5.

Table 5
The STS Class Students in Degree of Satisfaction to the Experts' Speech.

Experts speech	M	SD
You can mean to the expert speech time arrangement in the satisfactory situation.	3.80	1.04
You can mean to the expert speech place arrangement in the satisfactory situation.	4.12	.66
You can mean to two experts speeches of programs in satisfactory situation	3.80	.76
You can mean the subject content which of the expert (1): "The science and technology and do the society-STS" and education: A Focus on learning and How do you know – in taking an example of the Digital Archive Program in the satisfactory situation.	3.88	.97
You can mean to the expert speech has related to the subject of content to the STS curriculum in the satisfactory situation.	3.64	.95
You can mean to the expert speech has related to the subject of content to the STScurriculum in the satisfactory situation.	4.00	.86
You can mean to the expert speech can properly arranged Q/A, promoted the teachers and students in discussion and the interaction together in the satisfactory situation.	3.72	.84
Overall, you can mean to the expert speech held on the STS curriculum its " Expert speech " in the degree of satisfaction	3.88	.97

(4) The STS class students regarding the degree of satisfaction of the student self-study on majority of the overall mean score is 3.72, therefore, the STS class students to the student self-study presented high degree of satisfaction. Others of the STS students to the self- study result presented higher degree of satisfaction. The results are shown in Table 6.

Table 6
The STS Class Students in Degree of Satisfaction to the Students' Self-study Result

Students' self-study result	M	SD
In the STS study course, you participated in attendance rate satisfactory situation of theclassroom discussion	3.56	.960
In STS study course, your self-study result and participation are in the teaching & learning activity in the satisfactory situation.	3.32	.988
In STS study course, your preparing and reviewing of lessens and classes are in the satisfactory situation.	3.60	.816
In the STS study course, your personally carries on the collection materials in the satisfactory situation.	3.72	.791
In the STS study course, you participated in group discussion in the satisfactory situation	3.44	1.08
In the STS study course, to STS curriculum teaching it "the cognition, the emotion situation, and the competency" three aspects obtains benefits in the satisfactory situation.	3.60	1.04
In the STS study course, you have achieved on "the participation, the attention, the happy " in the study of the satisfactory situation.	3.60	1.01
In the STS study course, you are willing to recommend the schoolmate to take the STS course and positively to participate in the discussion in the satisfactory situation.	3.60	1.00
Overall, you can mean to the students' self-study held on the STS curriculum. The "Students' self-study result" is at the degree of satisfaction.	3.72	.737

Analysis Results

(1) The different educational system, grade, department are in the teacher instruction, TA teaching, expert speech and overall of the STS teaching strategy and the pattern in degree of satisfaction, and not reveals the different ($p>0.05$). The results are shown in Table 7.

Table 7
The Different Educational System, Grade, Department are Based on the Teacher Instruction, TA Teaching, Expert Speech and, Overall of the STS Teaching Strategy and the Pattern in Degree of Satisfaction

	Education System		Grade		Department	
	F-test	Presented	F-test	Presented	F-test	Presented
Teachers' instruction	.041	.840	1.166	.330	.849	.549
TAs' teaching	.527	.475	3.339	.054	.416	.859
Experts' speech	.024	.878	.265	.769	1.019	.444
Overall of the STS teaching strategy and the pattern	.120	.732	.927	.411	.766	.599

(2) The different educational system, grade, department are based on the student self-study result in the degree of satisfaction which are not presented the difference ($p>0.05$). The results are shown in Table 8.

Table 8
The Different Educational System, Grade, Department are based on the Student Self-study Result in the Degree of Satisfaction which are not Presented the Difference.

	Education System		Grade		Department	
	F-test	Presented	F-test	Presented	F-test	Presented
Teachers' self-study result	.479	.496	1.346	.281	.999	.456

(3)The sub-items of the STS teaching strategy and the pattern and the student self-study result are presented positive relation. The results are shown in Table 9.

Table 9
The Students' Self-study Result and the STS Teaching Strategy and the Model in the Correlation of are Presented

	Teacher's instruction	TA's teaching	Expert's speech	Overall of the STS teaching strategy and pattern
Students' self-study result	.800**	.621**	.888**	.945**

Note. ** P<.01

The Findings and Discussions of the Qualitative Research

This research affiliation focuses on a half structural formula by the way of research survey and so on depth discussion, literature review and analyze in observation, enhancing and collecting for the correlation of document of text material.

(1) Gender and attitude: The different gender can have the different study pattern and the attitude

(2) Individual demographic characteristic and study course: The study course can have a difference because of individual demographic characteristic with the self-expectation.

(3) Discipline domain and self-study result: Different discipline domain, its self-study results has presented a difference.

Conclusions and Suggestions

Conclusions

In the process of the studies of STS, students realized making up the pleasure by the "doing by learning", shared experiences and opinions among the partners with the different specialized background knowledge. It is not only helpful to promote the student to the STS cognition, but also deepen them to more concern in the environment

of society.

Suggestions

Based on the results of this study, the following suggestions were made:

(1) Establishing a set of evaluation system, understanding students' background and motive, grasping the students' goal of the STS class.

(2) Enhancing the female students' study of the motive and interest to the STS curriculum, breakthrough tradition idea on the female to the arts and culture, the male to technical mechanical impression.

(3) To be established the teaching assistant service team, to invite experience student of the STS subject to sharing with the discipline of counseling service.

(4) To enhance the TAs' teaching competency focus on the professional knowledge of the STS curriculum, then to cultivate the teachers' teaching competency of the STS, including instructional design, teaching material development and teaching method and so on.

(5) Additionally, to create curriculum of the STS program in the institute of the universities, colleges and institutes, cultivating and training teaching assistant for the STS curriculum; And thus investment teaching scene, conducts the action study, understands the cognition of the students and the result of the study in STS.

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A Technology Assessment Tool by the Public Participation in Korea

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ABSTRACT This paper aims to create a tool for the evaluation of technological influence that the public (Koreans) can easily participate. This tool will help to instill recognition regarding the need for technology assessment. In order to achieve this objective, first; previous studies were reviewed, and then a Delphi investigation was implemented by experts from many different fields. The fourth attempt of the Delphi investigation provided reasonable categories for the evaluation of technological influence. Using this, a tool for the evaluation of technological influence was created, which was composed of 20 items. This tool was used for evaluation of technological influence of the creation of a potential 'Grand Canal Business' by the current government in Korea.

KEY WORDS Technology Assessment Tool, Evaluation, Delphi, Korea

Introduction

An evaluation of technological influence can be used as a measure to prevent the destructive consequences of irrational developments of technology (Yeom, 2000).

In this way, technology assessments need to be expanded in terms of knowledge and methodology in order to decrease the defects and uncertainties of a developing technology (Fleischer, Hocke & Grunwald, 2005).

However, the problem with evaluations of technological influence is that the assessment can differ depending on the participant. Because subjective opinions can be included. In addition, when evaluations are requested from a group of professionals, it is both time-consuming and expensive. The United States' Office of Technology Assessment (OTA) temporarily closed for similar reasons; the political misuse by the participants and assembly, lack of reasonable management, and the excessive time and budget required for a perfect assessment (KISTEP, 2005).

Therefore, it seems most suitable that the participants, who make up the most important aspect of the evaluation of technological influence, should be composed of the ordinary public. However, even though the public participates in the assessment of

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technological influence, it is not always easy to express and approach an opinion. This difficulty results from the technological terminology within the assessment surveys, which is hard to comprehend for someone without a background in technology. In the end, the process of using and developing new technology requires not only the inventor of the technology, but also the participation of the administrator, the government and the ordinary public. This makes the education of the evaluation of technological influence important and many researchers have voiced their opinions regarding this matter for a long period of time (Gerd, 1999; Rasinen, 2003).

A democratic society emphasizes the understanding of the influence of technology even in rudimentary technological knowledge that is considered to be mandatory for ordinary citizens. Although the purpose of attaining rudimentary technological knowledge is for the education of the subject of technology (ITEA, 2000), there is little mention of the control of technology and the evaluation of technological influence (Lee at al., 2005). In order to formulate contents regarding the evaluation of technological influence, there requires an understanding of the components of the assessment. However, because Korea's technology assessment has only been implemented for a short amount of time and there is no legal standardized tool for the evaluation of technological influence, the priority lies in developing a method for the assessment of technology.

For Korea, in order to prevent an outcome similar to the US OTA, an assessment tool that is both easily accessed by the public and not costly in time and budget needs to be developed. To take it a step further, evaluation of technological influence should be added into the education of technology and professors should learn to educate their students on the correct attitude regarding technological developments. Thus, the creation of a tool for technology assessment that encompasses an objective evaluation standard is a logical step that needs to be taken. This will be a great contribution to a systematic evaluation of technological influence and the education of technology.

Therefore, the goal of this research was to create a tool for the evaluation of technological influence that focuses on the participation of the public (Koreans) and to instill the importance of technology assessment.

Generations of Technology Assessments

The term 'technology assessment' was first officially used in 1966 in a subcommittee report on a House of Representatives' science research development project. Emilio Daddario, the chairmen, lectured to the committee on the importance of the evaluation of technological influence. In 1972, the Technology Assessment Act was passed, and the world's first OTA was created under the protection of the Congress. Following America's act, other European countries soon formed their own organizations. Since then, the paradigm of technology assessment has continually been transforming.

The shift in the paradigm of technology assessment is divided into the first, second and third generations. The first generation of technology assessment served as an early

alarm form of evaluation and was influenced by technology determinism ideas. An early alarm assessment worked by emphasizing the importance of foreshadowing the negative impacts of technological developments and predicting the social impacts of scientific technology. Its foundation was the assumption that policy designers could use these evaluations during their decision-making process. The decision-making process focused on objective and realistic evaluations and because assessments were performed by universities and research facilities, a lot of responsibility was required on the part of the scientist. The fundamental principle of the United States OTA was 'a committee-centered organization, participation of associates, and the monitoring of report qualities,' and its purpose was to use as many scientific methods as possible to analyze information correctly and provide options on formulating policies. However, this paradigm was a second-hand approach that underestimated the defective effect of the economy on society. Furthermore, its influence was limited to singular encounters of business rather than that of the whole. It was also not as effective because most of the evaluations of technological influence were done during the latter or after stages of technological development.

The second generation of technology assessment was introduced after the 1980s. As a syntactical evaluation of technological influence, it was affected by societal constructivism and formationism. The evaluation of a secondary influence of technology varied according to the assessor, which made it difficult to portray information regarding technological development in an objective manner. By involving everyone in the process of evaluating technological influence, the second generation of technology assessment emphasized the importance of communication with society. The working class and citizens began to voice more opinions regarding technological developments and the government attempted to close the gap between technology legislations and the public. After the 1990s, a new syntactical paradigm was appeared, which included technology planning and tactical issues regarding future moves on technology. Through this, the focus was put on the participation of the public on matters regarding technological developments in order to minimize negative impacts and accentuate the good. Syntactical assessment of technology accurately identifies the subject of the act of technological developments and formulates a scenario of the technology's interaction, future prediction, and counteractive measures. However, similar to the 1st generation paradigm, syntactical technology assessment also had the problem of evaluating after the technology had already been processed and the lacking of cooperation with the formation of scientific technology policy methods and the technological development process.

From the first and second generations of technology assessments, there is mention of a third generation evaluation of technological influence from various researchers. The combined assessment method proposed by Berloznik and Lagenhove (1999) allowed realistic results to be attained through scientists' directly applying an evaluation of technological influence in the field. While the process of assessment is on-going, the researchers can think about the scientific effects of technological developments on society and offer feedback during the project so that the resulting outcome is not

negative. This on-site, live evaluation of technological influence incorporates the study of natural science, engineering, social science and political research. Unlike syntactical assessment, live evaluations of technological influence minimizes negative impacts by eliminating controlled experiments but instead providing feedback and forming scenarios to create effective public opinion polls (Guston & Sarewitz, 2002). Ultimately, third generation assessment techniques are a sound form of evaluating technological influence because it perceives technological developments as a systematic action and acknowledges that both active social groups and passive citizens are needed as influence.

Methodology

Research Process

Method	Research process	Research materials
Literature Review	1.Theoretical study (2006.6-2007.10)	Study of the concept of technological influence Analysis of documents and reports concerned with the evaluation of technological influence Study of documents correlating technology assessment with sociology, ethics, and environment
Delphi survey	2.Pre-Delphi survey (2007.11.5-2007.12.5)	Investigation of Delphi panel selection standards Selection of Delphi panels Creation for Delphi survey tools Editing of Delphi survey tools through interviews with the committee in question
	3.The first Delphi survey (2007.12.15-2008.1.9)	Categorization of items and the formation of the evaluation domain based on panel opinion Editing and supplementing of evaluation territory based on the opinions of the committee Structuring of Delphi survey tools (extraction of 10 domains and 33 items)
	4.The second Delphi survey (2008.1.24-2008.2.15)	Examining the validity using CVR The editing and supplementing of categories and domains based on panel opinion (extraction 5 domains / 20 items)
	5.The third Delphi survey (2008.2.18-2008.2.29)	Examining the validity using CVR The editing and supplementing of categories and domains based on panel opinion
	6.The forth Delphi survey (2008.3.3-2008.3.28)	Attaining validity and significance of the evaluation domain and items Creation of a tool to evaluate technological influence
Application of the newly developed tool	7. Pilot test (2008.5.7)	Item analysis and attaining reliability (Cronbach's α= .886)
	8. Actual application test (2008.6.15-2008.7.10)	Actual evaluation of technological influence (Grand Canal Business), item analysis, and guarantee of reliability (Cronbach's α = .900) Confirmation of assessment tool

Figure 1. Research Process

Delphi Survey

In order to deduce a standard for the selection of the panel, a request for the selection was made to ninty-seven individuals that had either published two or more papers in academic magazines on the topics of technology education and the study of industry, or had a doctorate degree from a university associated with technology education and industrial studies. Through this appeal, the following category for the selection of Delphi panels was as follows:

First, a person with either two or more articles published in an academic magazine focusing on technology and/or technology assessment, or participated in two or more national-level research.

Second, a person with a doctorate degree or higher from a university associated with technology and/or technology assessment

Third, a person who has worked in a field related to technology and/or technology education for more than seven years, or in charge of duties related to evaluating technological influence for more than two years.

Fifty persons that fell under more than two of the above categories were appointed as Delphi panels, and ultimately, thirty-two people acquiesced to initiate the Delphi survey. During the time of the survey, Korea's technology assessment had only been active for four years, and thus the time of expertise regarding evaluating technological influence was set to two years or more. Table 1 shows the specific majors for the Delphi panels.

Table 1
Specific Majors of Delphi Panel Members

Major	Number of People	Percentage (%)
Technology Education	9	28.12
Mechanical Engineering	8	25.00
Electric Engineering	7	21.88
Engineering in other area	5	15.62
Business Administration	2	6.25
Agricultural Industry Education	1	3.13
Total	32	100.00

Results

Deduced Domain and Items of Technology Assessment

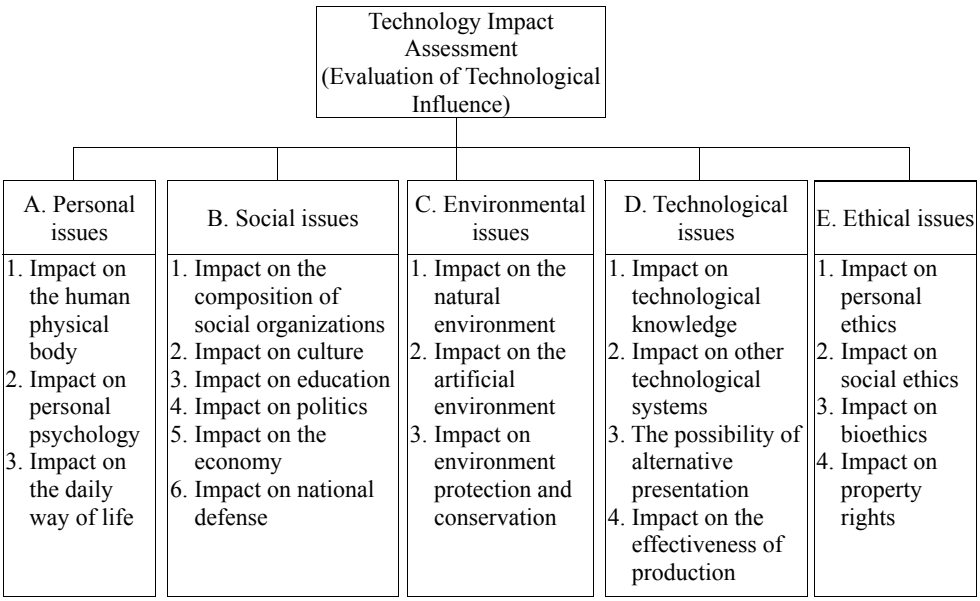

Figure 2. System of Domains (Categories) and Items of Technology Assessment

The Developed Tool for the Technology Impact Assessment

The developed tool was consisted of five parts: personal issues, social issues, environmental issues, technological issues and ethical issues. It utilized a five-point Likert-type scale as strongly negative (1), negative (2), neutral (3), positive (4), and strongly positive (5). And each items had a blank for writing a reason for evaluation.

Personal issues

1) How is the human body physically affected by the development of the technology under evaluation?
2) How is personal psychology impacted by the development of the technology under evaluation?
3) How is daily life impacted by the development of the technology under evaluation?

Social issues

4) How is the composition of social organizations impacted by the development of the technology under evaluation?
5) How is culture impacted by the development of the technology under evaluation?

6) How is education impacted by the development of the technology under evaluation?
7) How is politics impacted by the development of the technology under evaluation?
8) How is economy impacted by the development of the technology under evaluation?
9) How is national defense impacted by the development of the technology under evaluation?

Environmental issues

10) How is the natural environment impacted by the development of the technology under evaluation?
11) How is the artificial environment impacted by the development of the technology under evaluation?
12) How is the protection and conservation of the environment impacted by the development of the technology under evaluation?

Technological issues

13) How is technological knowledge impacted by the development of the technology under evaluation?
14) How are other technological systems impacted by the development of the technology under evaluation?
15) Is there better alternative than the development of the technology under evaluation?
16) How is the effectiveness of production impacted by the development of the technology under evaluation?

Ethical issues

17) How are personal ethics impacted by the development of the technology under evaluation?
18) How are social ethics impacted by the development of the technology under evaluation?
19) How are bioethics impacted by the development of the technology under evaluation?
20) How are property rights impacted by the development of the technology under evaluation?

Validity for the Tool

Table 2
Content Validity for the Domain of the Technology Assessment Tool

Category	The result of the 3rd Delphi survey			The result of the 4th Delphi survey			CVR (increment/decrement)
	M	SD	CVR	M	SD	CVR	
A	4.38	.86	.93	4.38	.56	1.00	↑
B	4.48	.69	.93	4.62	.49	1.00	↑
C	4.55	.69	.93	4.76	.44	1.00	↑
D	4.52	.57	1.00	4.68	.48	1.00	
E	4.38	.86	.93	4.52	.51	1.00	↑

Table 3
Content Validity for the Item of the Technology Assessment Tool

Category	The result of the 3rd Delphi survey				The result of the 4th Delphi survey				CVR (increment/decrement)
	Item	M	SD	CVR	Item	M	SD	CVR	
A	A1	4.36	.95	.93	A1	4.54	.58	1.00	↑
	A2	4.14	.89	.93	A2	4.29	.60	1.00	↑
	A3	4.54	.84	.93	A3	4.79	.42	1.00	↑
B	B1	4.25	.89	.93	B1	4.50	.58	1.00	↑
	B2	4.50	.75	.93	B2	4.75	.44	1.00	↑
	B3	4.25	.89	.93	B3	4.43	.57	1.00	↑
	B4	4.14	.97	.86	B4	4.18	.67	.93	↑
	B5	4.68	.82	.93	B5	4.96	.19	1.00	↑
	B6	3.93	1.02	.86	B6	4.29	.76	.93	↑
C	C1	4.61	.83	.93	C1	4.79	.42	1.00	↑
	C2	4.54	.88	.93					
	C3	4.61	.69	.93					
	C4	4.25	.89	.86	C2	4.43	.57	1.00	↑
	C5	4.50	.88	.93	C3	4.68	.48	1.00	↑
D	D1	4.14	1.01	.86	D1	4.36	.62	1.00	↑
	D2	4.29	.98	.86	D2	4.54	.58	1.00	↑
	D3	4.18	.94	.86	D3	4.39	.57	1.00	↑
	D4	4.00	1.21	.72	D4	4.11	.99	.86	↑
E	E1	4.04	.96	.79	E1	4.43	.50	1.00	↑
	E2	4.14	.76	.93	E2	4.36	.49	1.00	↑
	E3	4.39	.79	.93	E3	4.64	.49	1.00	↑
	E4	4.14	.80	.93	E4	4.29	.53	1.00	↑

Note. CVR = (Ne - N/2)/(N/2); here, Ne refers to the number of responses that were marked as ‘valid’ and N is the total number of the Delphi panelists

Reliability

In order to test the reliability of the public opinion for the tool to evaluate technological influence, an application trial was performed on 274 people on the 'Development of a Grand Canal in Korea.' The results showed that the Cronbach's α value was .900: a very high reliability of the tool for technology assessment. In addition, when an item was removed, α value of elimination did not rise, showing that all 20 items could be used for the evaluation of technological influence. The test's total average value was 50.95 out of 100(20 items x 5 (maximum value of Likert-scale) and the standard deviation was 12.50.

Table 4
Results of the Reliability Test by Each Group for the Technology Assessment Tool

Group	Number of People	M	SD	Cronbach's α
Junior High School Student	64	46.13	13.36	.889
High School Student	72	50.98	12.12	.902
University Student	93	52.83	11.20	.883
Teacher	32	55.81	12.34	.916
Professional	13	52.49	13.50	.933
Total	274	51.65	12.50	.900

Results of the Application Trial (Concerning Korea's Technological Developments on the Development of a Grand Canal)

Using the tool for evaluating technological influence created through this study, an application trial was performed on the development of a grand canal in Korea. Using a Likert scale, more than three 'valid' responses in each item meant that the technology had a positive influence, while less than three 'valid' responses meant a negative impact. As the below Figure 3 shows, daily life (3.1), culture (3.1), economy (3.0), technological knowledge (3.5), other technological systems (3.3), and effectiveness of production (3.2) were evaluated to be positive influences. In natural environment (1.4) and environment preservation and conservation (1.5), the impact was assessed to be very negative.

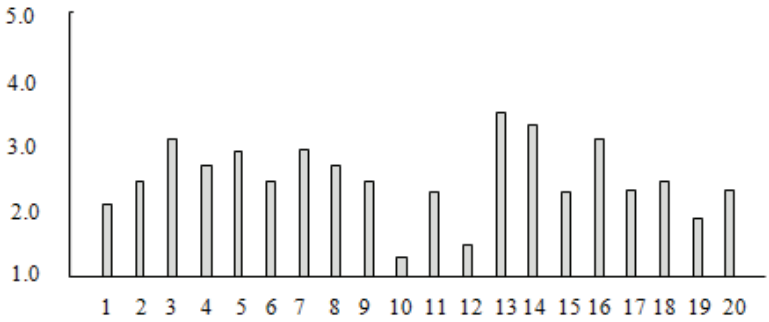

Figure3. Likert Scale Score for the Each Item

The distribution of domain (category) responses showed that the development of a grand canal would have a negative impact on personal, social, environmental and ethical issues, and an especially derogatory effect on environmental issues. Figure 4 shows the results of the Likert scale scores for the each domain.

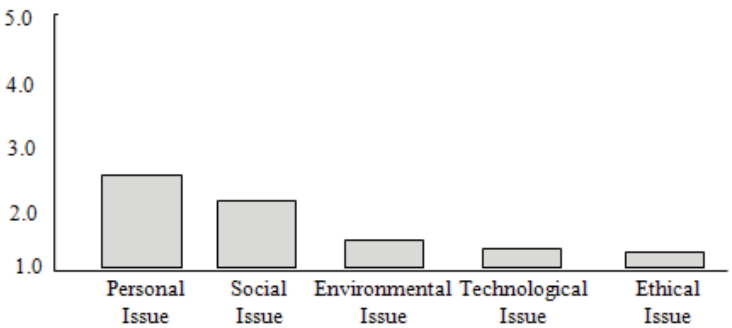

Figure 4. Likert Scale Score for the Each Domain (Category)

Conclusion and Recommendation

The tool for the evaluation of technological influence developed in this paper can be used by both professionals and the public easily and logically to understand the effects of a certain technology. The domain and items for technology assessment deduced from this investigation can be used in technology education courses as the basic data to create standards during evaluations of technological influence. Furthermore, by actually evaluating certain technologies in technology education classes, the students can grow an appreciation for the need to consider human and environmental impacts that the construction and development of technology can bring. It will also provide them with an opportunity to reflect upon technologies that is currently used. By using technology assessments, the technological developments that have had negative results can be used

to think of new techniques that will have a positive impact.

For a more expanded investigation, the following considerations are suggested:

First, technology that is set to be developed can be assessed using by the tool for the evaluation of technological influence developed in this paper and the results should be analyzed.

Second, an effort needs to be made to use the domains and categories of the evaluation developed in this study within the process of technology education.

Third, evaluations need to be performed on the technologies being studied in technology education classes and the change in attitude of the students resulting from this assessment needs to be studied.

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Needs Assessment on Educational Competencies Required of Vocational Technical College Teachers in Shandong of China

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ABSTRACT The purpose of this study was to determine the educational competencies and needs of vocational technical teachers in Shandong of China. The population of this study is the vocational technical college teachers in Shandong of China. In this study, a cluster sampling with stratification method was used. A total of 50 questionnaires were distributed to each of these 10 colleges, and information from 500 vocational technical college teachers was drawn for data collection. The educational competency scale was developed from the educational competencies of the Performance-Based Teacher Education Modules which were developed by Norton (1987) at Ohio State University in the US. Based on the findings of the study, it was concluded that: first, all vocational technical teachers in Shandong considered the 14 educational competency categories to be important, with instructional evaluation being the most important competency; second, the present educational competency level of the vocational educational technical college teachers in Shandong was at the average level; third, the educational needs of the vocational educational technical college teacher in Shandong were at the higher level, especially for the educational competencies of instructional evaluation, coordination of cooperative education, coordination of cooperative education, serving students with special/ exceptional needs, and assisting students in improving their basic skills.

KEY WORDS Needs Assessment, Educational Competency, Vocational Technical College, Post-secondary Vocational Education

Introduction

In the middle of the 20th century, because of the technological revolution, the structure of the labor force was changed and mental work gradually took the place of the physical work (Ji, 1995). This change pushed for the post-secondary vocational education to be developed as the secondary vocational education had its limits related to the technology

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and economic requirements. From this point, teacher's competencies have become more and more stressed in post-secondary vocational education because they play an important role during the instructing and learning process. And, many studies on teachers in post-secondary vocational education were conducted in countries including the United States of America, European countries and Korea (McCaslin et al., 1995; Na, 2006; Na et al., 1998, 2001; Wang, 1999).

Vocational education development in China was almost 20 years later than that of other developed countries. However, nowadays, vocational education is focused and developed rapidly because China's industrialization and modernization process required higher technical talents (Liu & Xu, 2002) and vocational education has a close relationship with economic and societal development. Furthermore, a large population is the fundamental reality of China, and to solve and mitigate the pressure of the employment problem, developing vocational education is an effective solution.

Vocational teacher's competency development becomes a critical problem in China for updating the technical skills and professional knowledge, improving the academic level of the vocational technical teacher, and constructing a reasonable structure of professional academic course teachers and practical course teachers. However, few studies focusing on the development of a vocational teacher's competency have been conducted in China.

In order to develop a vocational teacher's competency effectively, there is a need for a fundamental study to be conducted to determine the present level and importance level of educational competencies required of vocational technical college teachers, and to identify their educational needs. This study could provide meaningful information to vocational technical teachers and colleges, as well as research institutions in China that lack of the information on how to support vocational teachers.

Therefore, the purpose of this study was to determine the educational competencies and needs of vocational technical teachers in Shandon of China. The specific objectives of this study were 1) to assess the importance level of educational competencies required of vocational technical college teachers, 2) to assess the present level of educational competencies of vocational technical college teachers, and 3) to determine the educational needs of vocational technical college teachers based on the present level and importance of educational competencies.

Review of Literature

Post-secondary vocational education is a higher form of vocational education, and it has different points with secondary or other types of vocational education but also contains some of their characteristics. Post-secondary education has a formal instructional program that is designed for the students who have completed the requirements for a high school or equivalent diploma (Howard, 2003). It has a compact relationship with business and industry, and supposes to transfer the necessary knowledge, skill and attitude which are needed by the learner for the specific vocation or occupation. Moreover, another function of a post-secondary vocational education is a bridge to provide an opportunity to the learner to get a higher academic degree.

The development of post-secondary vocational education in China was almost 20 years later than that in developed countries. Their advanced understanding of vocational education and experiences had a great effect on the vocational education reform. The economic globalization and the development of the services and manufacturing industry stimulated the development of post-secondary vocational education. As a result, the requirements for technologists, technician and varied talents promoted the reform and advancement of the post-secondary vocational education, and it takes more and more important position in the vocational education system.

In 1996, the Vocational Education Law was published and it stated that vocational education be separated into primary level, middle level and high level vocational education. This was the first time to recognize higher vocational education in law. And following this, there are also three kinds of vocational school: elementary vocational school, technical school and technical college. The vocational technical college belongs to the post-secondary level of vocational education. The technical vocational college usually enrolls graduates from high school and the graduates from technical schools who have finished three years of study. The official mission of this college is to training technologists and technicians and to prepare the student for a highly professional technical area or management area. In 2002, the State Council of China published The Decision to Develop the Vocational Education Reform, which stated that all vocational colleges, which had previously had a number of names, should gradually acquire the same name of 'XX Vocational Technical College.' The technical schools that belong to secondary vocational school level were the main part of the vocational education system in the past, but since the economic and technical development, the market needed more advanced workers and laborers with high technical skills, this stimulated the development of post-secondary education. Also under the influence of the educational reforms, after 2003, many technical schools were upgraded to technical vocational colleges and the vocational technical college began to rapidly growing in each province.

Table 1
The Numbers of Post-secondary Vocational Education Institutions and Vocational Technical Colleges

Section	2003	2004	2005	2006
Post-secondary vocational education institutions	908	1047	1091	1147
Vocational technical colleges	711	872	921	981
Ratio (%)	78.3	83.3	84.4	85.5

Source: Ministry of Education of People's Republic of China. (2007).

Generally, the vocational technical college in China is on the same level of college education in Korea and the community college in the Unite State. The function of this college is to train students in skilled talents for the industry and service society, as well as to provide the opportunity of continued study to student (Vocational Education Law,

1996). Government policy indicated that students were required to master basic academic knowledge, professional knowledge, and the practical technical skills. These colleges usually enroll graduates from high school who pass the standardized admission exam and go on to study programs lasting for three or four years. There are two or three year courses for the students that supply certificates to students.

Vocational Technical College Teachers in China

The vocational technical college teacher is a high-level vocational teacher, who at least has a bachelor degree and equivalent academic background, or the person who have special technical skill and has passed the national teacher certification exam also could be a vocational technical teacher. In China, the importance and the job description of a vocational teacher has a clear regulation which states that a vocational technical teacher is a professional in teaching and is responsible for teaching and instructing, have special technical skill and teaching certification. They should have teaching and research ability, and the outstanding different with the university teacher is besides teaching theory they are also responsible for the practical teaching (Higher Education Law, 1998; Teacher Law of China, 1998). The Chinese government began to implement the Teacher Law from 1994, which prescribed, "A teacher is the person who carries out the teaching responsibility". This was the first declaration of the teacher's professional position in law. In 1995, the Ministry of Education of China announced The Certification Regulations of Teachers. In 2000, the Education Department of China published the Methods to Implementing the Certification Regulation of Teachers, and from 2001 the teacher certification system began to be executed. At the same time, the first book, which scientifically classifying jobs named the Occupations Classification in China was published. This authoritative book claimed teachers belonged to a professional technical occupation for the first time. It is also meant a lot to vocational technical teacher. Only after establishing and recognizing role of the teacher in society could be advancements in education and retraining to enhance post-secondary vocational teachers' competencies. Through 20 years of growth there have been many achievements in vocational teachers' education and training.

Table 2
Situation of Teachers and Students in Post-secondary Vocational School

Sections	2003	2004	2005	2006
Teacher (a)	14.95	19.34	22.10	26.66
Students (b)	201.79	268.28	348.90	438.41
Ratio (b/a)	13.50	13.87	15.79	16.44

Note. Unit is 10 thousand Person
Source: Ministry of Education of People's Republic of China. (2007).

Educational Competency

There are many researcher and scholars give the definition of educational competency from different side and the phrases what they use were different, “educational competency”, “teacher's competence”, “teaching ability”, “education skills”, “teacher’s responsibilities” and so forth. There are many different researches about educational competency from diversity sides and views. Educational competencies are not stable and when faced with different students a teacher may require a new variety of competencies. There has been much research on educational competencies before and many diverse concepts and definitions have appeared from both a broad sense and a narrow sense. But a clear definition is important for anyone who seeks to develop teaching skill and ability, and also for those who design teacher training programs. The Higher Education Law of China (1998) put forth standards for higher education department’s instructional requirements, independence in planning instructional programs, choosing or developing instructional materials, and organizing and executing instructional activities. The Vocational Education Law of China (1996) demanded that vocational education implements government education policies, instructs the political education and professional ethics, teaches vocational knowledge, trains students in vocational techniques, has vocational instruction, and improves the students’ qualities in every aspect. The Teacher Law of China (1998) indicated teachers’ rights such as teaching activities, having the right to reform, experiment, and research education and training programs, participating in academic communication, joining professional academic groups and presenting opinions regarding the instruction of students and their development. Also, teachers' rights include evaluating students’ behavior and determining student grades.

Meanwhile, Norton, Robert E. (1987) summarized that based on competency-based education, the educational competencies required of vocational teachers consisted of 14 competency categories and 132 competency items. The categories begin with 1) program planning, development, and evaluation are fundamental components of a competency-based education 2) instructional planning 3) instructional execution 4) instructional evaluation 5) instructional management 6) guidance 7) competency of organize and manage vocational student organizations 8) a teacher's professional role and development 9) the competency to coordinate cooperative education 10) management and coordination competency for the cooperative education 11) implement a competency-based education 12) serving students with special/exceptional needs 13) aid students in improving their basic skills 14) teaching adults.

Above all, we can identify that vocational technical college teachers must take the responsibilities for planning, developing and evaluating the program. Planning, execution, evaluation and management instruction are also fundamental aspects. Also essential are the assistance and guidance of students’ activities, studying the maintenance of school and community, coordinating cooperative education, and researching and studying to update professional knowledge and skills.

Table 3
Previous Studies of Educational Competencies

Compe-tencies	Gorelick (1974)	Mndehele (1994)	Lee (2003)	Wang et al. (1999)	Liu et al. (2004)	Ye & Zhou (1998)	Higher Educational Law (1998)	Vocational Educational Law (1996)	Teacher Law (1998)	Norton, Robert E. (1987)
A	○	○	○	○	○		○	○	○	○
B			○		○	○	○	○	○	○
C		○	○	○	○	○	○	○	○	○
D		○	○		○	○			○	○
E	○		○	○	○	○			○	○
F	○	○	○		○	○			○	○
G	○	○	○	○	○		○	○		○
H		○		○		○	○			○
I	○	○	○	○	○	○	○	○	○	○
J		○	○	○	○		○			○
K		○			○		○	○		○
L							○			○
M		○	○	○		○		○	○	○
N							○	○		○

Note: A program planning, development, and evaluation, B instructional planning, C instructional execution, D instructional evaluation, E instructional management, F guidance, G school-community relations, H vocational student organization, I professional role and development, J coordination of cooperative education, K implementing competence-based education (CBE), L serving students with special/exceptional needs, M assisting students in improving their basic skills, N teaching adults

Educational Needs Assessment

Needs assessment usually measures what should be enhanced in an education or training course, with the needs assessment centering on needs and not desires. Witkin and Atschuld (1995) defined needs assessment as "a systematic set of procedures undertaken for the purpose of setting priorities and making decisions about program or organizational improvement and allocation of resources." Needs assessment is a process that examines the gap between the current level and desirable level, through needs assessment can identify which parts of education are needed and which are not. Also, the results of needs assessments can be a foundation to analyze an educational program, the results of a needs assessment can help educational program designers to save time during the development process and make the training course more suitable to the learner.

McCaslin, Ojomo and Na (1995) identified Ohio's community college and professional development needs of the agriculture teachers of the technical institute. The highest needs of these teachers were abilities to assess/diagnose student needs, use computers and skills in promoting programs. Also, important instructional and program management skills/techniques which post-secondary agriculture teachers perceived were related to their functional responsibilities as an instructor such as planning,

implementation, and evaluation of instruction.

According to research on educational needs of the industry teachers (Kim, 1997) the educational needs of improving the educational process through analyzing the performance of the learner was the most needed competency. The research of Na and Lee and Choi (2006) concluded that among the various responsibilities, instruction of the teaching and learning was the most needed educational competency of middle technical teachers. Moreover, the educational needs were higher in areas of mastering the individual characteristics of the learner, preparing the teaching materials, arousing motivation of the student in learning, using diverse teaching methods, answering questions with a proper answer, and planning evaluation.

Na and Kim (1998) studied performance levels and educational needs on competencies needed for practical arts education of elementary teachers in Daegu, Korea. In this study, performance levels were measured as performance abilities on exercises of a practical arts education course. The results showed the cultivating and making area to be their highest need. Na (2006) determined the present performance level and the educational needs of agricultural teachers in Korea. The highest level needs were 'Serving students with special/exceptional needs', 'Program planning, development, and evaluation', 'Implementing competency-based education' and 'Assisting students in improving their basic skills'.

Based on the research (Park, 1996; Lee & Na, 2006; Na, 2006) and so forth, there were differences of educational needs due to individual characteristics such as teaching experience, age, gender, academic background and the location each teacher. After reviewing these results, we can preconceive that the educational needs will be different for technical college teachers according to their individual characteristics.

The above research demonstrates that educational needs assessment is a complicated but process is necessary to measure the needs of teachers. Discovering what the actual educational needs of teachers has significant meanings for teacher training and education programs designing, and also indicates areas that will improve a teacher's and a program's effectiveness and enhance the competencies of teachers.

Methodology

Population and Sample

The population of this study was the vocational technical college teachers in Shandong of China. According to China National Statistical Department, there are 69 vocational technical colleges and 24,194 vocational technical teachers in Shandong (China National Statistical Department, 2008). If these teachers are to be the population, the number of samples should be over 379 teachers (Krejcie & Morgan, 1970).

In this study a cluster sampling with stratification method was used. Following the different locations of the vocational technical colleges, they are separated into the colleges established in larger urban centers (big cities) and the colleges established in medium-sized urban centers (middle cities). Supposedly the vocational technical

colleges, which are located in big and middle cities, have differences because of the different education environment and support. According to this, the vocational teachers who work in different colleges have differences in the importance of educational competency and educational needs. At Shandong province, there are 36 colleges in Big Cities and 33 colleges at Middle Cities. Based on those colleges, a total of 10 colleges were selected randomly, 5 colleges selected from 36 colleges in Big Cities and 5 colleges selected from 33 colleges in Middle Cities. A total of 50 teachers were selected by random sampling from each selected college. Finally, 500 vocational college teachers were sampled.

Instrumentation

Educational competencies were measured by a developed instrument based on the educational competencies of the Performance-Based Teacher Education Modules which were developed by Center on Education and Training for Employment (1987) at Ohio State University in USA. The educational competencies instrument consisted of 14 categories and 132 items.

Norton, Robert E. (1987) indicated 14 categories of the educational competencies, which the vocational teacher should have. Those educational competencies are; A. program planning, development, and evaluation, B. instructional planning, C. instructional execution, D. instructional evaluation, E. instructional management, F. guidance, G. school-community relations, H. vocational student organization, I. professional role and development, J. coordination of cooperative education, K. implementing competence- based education (CBE), L. serving students with special or exceptional needs, M. assisting students in improving their basic skills, and N. teaching adults.

The educational competencies scale related to importance level and present level of educational competencies perceived by vocational technical college teachers. Ant it utilized a five point Likert-type scale. The importance level of educational competencies scale was divided into ‘very unimportant = 1, unimportant = 2, average = 3, important = 4, and very important = 5.’ The present level of educational competencies scale was divided into ‘very low = 1, low = 2, average= 3, high = 4, and very high = 5’. Questionnaires were used for the data collection, consisting of ‘Educational Competency’ and ‘Individual Characteristics’.

Data Analysis

The data collected from the survey instrument analyzed with SPSS 12.0 Statistical Program and Microsoft Excel 2007 program. Descriptive statistics such as frequency, percentage, average, standard deviation were used to analyze the importance and the present level of educational competency of vocational technical college teachers. Also, inferential statistics such as t-test and ANOVA were used to analyze the different of characteristics importance and present level of educational competency by demographic characteristics. Based on the present level of educational competencies and importance

level of educational competencies, the educational needs were calculated by the educational needs formula which developed by Borich (1980).

Results

The present, important and educational needs level, and priorities of educational competencies categories are listed in Table 4.

Table 4
Present, Important and Needs Level and Priority of Educational Competencies

Educational Competencies	Present		Important		Needs	Priority
	Mean	SD	Mean	SD		
A. Program planning, Development, and Evaluation	3.04	.189	3.94	.168	3.53	12
B. Instructional Planning	3.17	.272	4.09	.271	3.79	7
C. Instructional Execution	3.15	.143	4.06	.172	3.69	11
D. Instructional Evaluation	3.22	.265	4.22	.261	4.22	1
E. Instructional Management	3.17	.198	4.10	.255	3.83	6
F. Guidance	3.03	.327	3.89	.451	3.34	14
G. School-community Relations	3.13	.215	4.00	.201	3.51	13
H. Vocational Student Organization	3.22	.283	4.19	.316	4.06	3
I. Professional role and Development	3.15	.208	4.06	.265	3.71	10
J. Coordination of Cooperative Education	3.16	.189	4.17	.256	4.21	2
K. Implementing competence-based Education(CBE)	3.14	.257	4.06	.313	3.72	9
L. Serving Students with Special/exceptional Needs	3.18	.176	4.15	.205	4.05	4
M. Assisting Students in Improving their Basic Skills	3.08	.240	4.04	.339	3.88	5
N. Teaching Adults	3.15	.278	4.06	.349	3.73	8
Total	3.14	.124	4.07	.142	3.79	-

Present Level of the Educational Competencies

The present educational competencies level of vocational technical college teachers in 14 categories were at the average level, with the maximum value being 3.22 and minimum value 3.03. The present level of guidance (3.03) was the lowest, and following it were program planning, development, and evaluation (3.04), assisting students in improving their basic skills (3.08), school-community relations (3.13), and

implementing competence-based education (3.14). For the present educational competency levels among 132 educational competencies items, prepare for a community survey (2.37) was the lowest, and following it were prepare teacher-made instructional materials (2.68), present information with overhead and opaque materials (2.68), gather student data using formal data-collection techniques (2.68), manage the daily routines of your CBE program (2.73), and determine individual training needs (2.73).

There were statistical differences in the present levels of educational competencies according to individual characteristics. The female group's present level of 3.14 for school-community relations was higher than the male group's level of 3.10. For academic background, the bachelor degree group's present level of 3.24 for vocational student organization was higher than the master or doctoral degree's level of 3.16. In regard to teacher's position, the head teacher's present level of head teacher group 3.20 for teaching adults was higher than the not a head teacher group's, which was 3.13. For location, the present level of the middle city group was 3.07, which was higher than the big city group's 3.00. In contrast, concerning teaching experience no statistical differences were found.

Importance Level of the Educational Competencies

The importance level of 14 educational competency categories are over 3.94, which means all the educational competencies are important to the vocational technical college teachers. Instructional evaluation (4.22) is the most important among the educational competencies followed by vocational student organization (4.19), coordination of cooperative education (4.17), serving students with special/exceptional needs (4.15), and instructional management (4.10). Among 132 educational competencies items, develop a course of study (4.99) is the most important educational competency, followed by work with members of the community (4.74), direct student laboratory experience (4.67), establish student performance criteria (4.67), and promote peer acceptance of exceptional students (4.64).

There were statistical differences in importance levels of education competencies according to the individual characteristics. For instance, the importance level of the male group was 4.06 and 4.13 for school-community relations and implementing competence-based education (CEB), which was higher than the female group's of 3.97 and 4.01; in academic background the importance level of instructional evaluation for the bachelor degree group was 4.24, which was higher than the master or doctoral degree level of 4.18. In regard to teaching experience, there were differences in importance levels for school-community relations and implementing competence-based education (CBE). The results of a post hoc test for these two categories showed the importance levels of the Less than 10 years group at 4.04 and 4.10, which were higher than the Over 20 years group's 3.97 and 4.01. On the other hand, concerning position and location no statistical differences were found.

Needs Level of the Educational Competencies

The educational needs of vocational technical college teachers in 14 categories were at a higher level and the maximum value was 4.22 and the minimum value was 3.34. In particular, the educational needs for instructional evaluation (4.22) were the highest. Following this were coordination of cooperative education (4.21), vocational student organization (4.06), serving students with special/exceptional needs (4.05), and assisting students in improving their basic skills (3.88). The educational needs of vocational technical college teachers among 132 educational competencies items were at a higher level, and develop a course of study (7.95) was the highest. Following this were assess student performance skills (5.74), assess the progress of exceptional students (5.66), direct student laboratory experience (5.41), and promote peer acceptance of exceptional students (5.40).

There were differences in educational needs following individual characteristics. The results of educational needs in the male group were at a higher level, with the top three being instructional evaluation (4.22), coordination of cooperative education (4.20), and vocational student organization (4.11). The Female group was also at a higher level, and the top three were instructional evaluation (4.24), coordination of cooperative education (4.21), and serving students with special/exceptional needs (4.10).

In regard to educational background, the educational needs of the bachelor degree group were higher for instructional evaluation (4.33), coordination of cooperative education (4.22), and serving students with special/exceptional needs (4.07). For the Master or Doctoral Degree group, the educational needs were higher for vocational student organization (4.21), coordination of cooperative education (4.18), and serving students with special/exceptional needs (3.99).

Concerning teaching experience, the educational needs of the less than 10 years group were higher for instructional evaluation (4.21), coordination of cooperative education (4.16), and vocational student organization (4.09). For the 10-20 years group, educational needs were higher for coordination of cooperative education (4.22), instructional evaluation (4.17), and serving students with special/exceptional needs (4.10). The Over 20-years group had educational needs that were higher for instructional evaluation (4.33), coordination of cooperative education (4.27), and serving students with special/exceptional needs (4.11).

In regard to position, the educational needs of the head teacher group were higher for coordination of cooperative education (4.11), vocational student organization (4.10), instructional evaluation (4.06). The educational needs for the Not a Head Teacher group were higher for instructional evaluation (4.28), coordination of cooperative education (4.24), and serving students with special/exceptional needs (4.08)

Concerning location, the educational needs of the big city group were higher for coordination of cooperative education (4.24), instructional evaluation (4.21), and serving students with special/exceptional needs (4.07). The educational needs of the middle city group were higher for instructional evaluation (4.25), coordination of cooperative education (4.18), and vocational student organization (4.07).

Conclusions and Recommendations

Conclusions

First, the vocational technical teacher in Shandong, they considered all of the 14 educational competency categories were important, especially the instructional evaluation was the most important competency. It means that to develop a course of study was the most important, followed by work with members of the community, direct student laboratory experience, establish student performance criteria, promote peer acceptance of exceptional students.

Second, the vocational technical teacher in Shandong, following the individual characteristics there were some importance differences by the educational competency categories, but in general no outstanding difference. The Male Teacher group considered school-community relations and implementing competence-based educational (CBE) to be more important to them than to the Female Teacher group. Teachers who have the bachelor degree considered that instructional evaluation competency was more important to them than to teachers who had a master or doctoral degree. Teachers who had less than 10 years of teaching experience considered that school-community relations and implementing CBE competencies were more important to them than to teachers who had over 20 years teaching experience.

Third, the present educational competency level of the vocational educational technical college teacher in Shandong was on the average level. Guidance was the lowest and following it were program planning, development and evaluation, assisting students in improving their basic skills, school-community relations, and implementing competence-based education (CBE). Specifically, Prepare for a Community Survey was at the lowest level, and following it were Prepare Teacher-Made Instructional Materials, Present Information with Overhead and Opaque Materials, Gather Student Data Using Formal Data-Collection Techniques, Manage the Daily Routines of Your CBE Program, and Determine Individual Training Needs.

Fourth, the vocational technical teacher in Shandong, following the individual characteristics there were some differences of the present educational competency by the educational competency categories. The Male teacher's group present educational competency was higher than the that of the Female teacher's group for school-community relations; the Bachelor Degree group was higher than the Master or Doctoral Degree group for vocational student organization; the Head teacher group was higher than the Not a head teacher group for teaching adults; the Middle City group was higher than the Big City group for guidance. However, there were no statistical differences at the other educational competencies. In addition, concerning teaching experience no differences were found.

Fifth, the educational needs of the vocational educational technical college teacher in Shandong were on the higher level, especially for the educational competencies of instructional evaluation, coordination of cooperative education, coordination of cooperative education, serving students with special/exceptional needs, and assisting students in improving their basic skills. Specifically, the educational needs of Develop a

Course of Study were the highest, and following it were Assess Student Performance Skills, Assess the Progress of Exceptional Students, Direct Student Laboratory Experience, and Promote Peer Acceptance of Exceptional Students.

Sixth, the vocational technical teacher in Shandong, following the individual characteristics, there were differences of educational needs and priority. The needs of the Bachelor Degree group were higher for instructional evaluation, but the needs of the Master or Doctoral Degree group were higher for vocational student organization. For the Less than 10 years teaching experience group, needs were higher for instructional evaluation, but the 10-20 years group had higher needs for coordination of cooperative education, and the Over 20 years group had higher needs for instructional evaluation. The Head teacher group had higher needs for coordination of cooperative education, and the Not a head teacher group had higher needs instructional evaluation. The Big City group had higher needs for coordination of cooperative education and the Middle City group had higher needs for instructional evaluation. In regard to gender there were few differences found.

Recommendations

First, training programs should be developed based on educational needs of vocational technical college teachers. Considered about the results of the educational needs in this study, the education aim, educational course and education content should be development.

Second, vocational technical college teachers need to be supported for in-service training programs consisted of various contents. As the results of this study there were different educational needs following the teachers' individual characteristics, the educational or training program should be developed by considered the differences of teacher's characteristics.

Third, future research about teaching and learning methods or strategies need to be conducted using educational needs in this study. Focus on improve the educational competencies, which the educational needs were higher, required to research on which kind of the education environment, condition and situation are need. There is required to research on the selecting, organizing, and actualization of contents which are applying teacher's training program to improve the educational competency level of the vocational technical college teachers.

Forth, future research needs to identify short and long-term supports to enhance educational competencies which are identified as an important and necessary in this study.

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A Study of the Career Planning Cognition Integrated Model on Career Decision-Making for Students of Technological Universities

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ABSTRACT This study aims to probe into technological university students' cognition of career planning cognition model, including career self-traits cognition, career information source cognition, and job market environment cognition, on the difference of current career decision-making and different variables. It also explores the correlation between, career planning cognition model and career decision-making level. This study is based on questionnaire survey, and the subjects are 372 graduating students of four-year technological universities and technology institutes in Taiwan. The data are analyzed by multi-regression and path analysis. The findings are as follows: there is a significant negative correlation between career self-traits cognition and career decision-making level; there is a significant and positive correlation among career information source cognition, job market environment cognition and career decision-making level. Career planning cognition factors, such as career self-traits cognition, career information source cognition, job market environment cognition, can predict the satisfaction with career decision-making.

KEY WORDS Technological University, Career Planning Cognition, Career Decision-Making

Introduction

According to the statistics of Directorate General of Budget, Accounting and Statistics, Executive Yuan (2006), from 2001 to 2005, the average unemployment rate of college graduates or above increased from 3.72% to 4.01%. The average unemployment rate in 2002 was the highest (4.28%). College graduates' employment survey conducted by the National Youth Commission (2005) indicated that 27.1% of the college graduates or above had jobs which were not directly related to their majors. The result is consistent with the survey of "higher education database" of Ministry of Education (2004). The

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figures above show that there is a gap between the graduates' professional knowledge/skills and their jobs, indicating the problems of self-exploration, occupation accommodation and lack of autonomy in job selection. Moreover, they lack sufficient career guidance, and supports or resources on career decision-making. In terms of career planning, Swain (1984) indicated that career planning model is consisted of three triangles and one circle. Career decision-making is their direct connection, and the circle is the core and it refers to a person's goal of career; each triangle is the key point of career exploration and planning, which state the three main factors in the setting of goals in life and career. Thus, in career development, there are many factors concerning of students' career decision-making. Many students lack self-cognition related to career, such as personality traits, job values, occupation interest, personal competence and occupation cognition. Also, they do not have specific expectation toward future. Before graduation, some students even realize that their learning is insufficient and they are lost for their future (Tseng, 2006). It demonstrates the importance of students' self-recognition of personality traits, job values, occupation interest, personal competence and occupation cognition on future career decision-making.

In addition, students' acquisition and collection of career related information and clarification of cognition toward job market is the first step to construct the career goal. They can then develop the competence of career decision-making and gradually recognize the direction of career to fulfill the concrete career planning and preparation. According to the theory of Swain and Super, with regard to career decision-making, a person should explore self-career cognition and inner world; in career selection or decision-making, one should evaluate and control the career related information sources and job market, and recognize one's career planning in the selection of jobs or further studies (Guo, 2003). Therefore, the recognition and exploration on the influences of the three factors on students' career decision-making level could enhance the students' future career development.

Based on above, this study constructs a career planning cognition model by probing into technological university students' personal background, career self-traits cognition, career information source cognition and job market environment cognition in order to recognize their influences on students' career decision-making as the criterion for the career decision-making of students who are soon to be graduating from technological university, as well as the career guidance and planning of the schools. Thus, the students can have the most proper career decision-making by precise self-recognition.

Upon the research background and motivations mentioned above, this study aims to explore the influences of students' career self-traits cognition, career information source cognition and job market environment cognition on their career decision-making, and analyze the integrated model.

"Career planning cognition model" in this study means that when students of technological universities have career planning, they made the decision by recognizing the personal psychological traits and external environment. Career planning cognition model includes three factors: career self-traits cognition, career information source cognition and job market environment cognition. Operational definitions refer to the

scores measured in the scales of career self-traits cognition, career information source cognition and job market environment cognition. High scores mean that the students recognize the said career planning cognition factors more.

Career decision-making level means that in career planning and when encountering the selection of advanced studies or jobs, a person makes the decision according to their traits, social situations, trend in job market and varied factors. The higher total scores in career decision-making level scales are, the more participants are uncertain about their personal careers.

Literature Review

Students' Tasks of Career Development

Higher universities and institutes of technology aim to cultivate professional talents with practical competence. Thus, besides emphasizing the professional training, they should also instruct the basic theoretical and scientific knowledge. In other words, they should rely on academic base to respond to the demand of new technology development. In addition, with sufficient scientific knowledge, students can survive in the competitive era of knowledge-based economy. Schools' prior task is to enhance students' adaptive development, allow them to have the core knowledge and occupational competence for current and future job market, and make them to be successful in advanced studies and future career.

Based on the above, for students of technological university, in advanced studies or job market, it is valuable and proper to value career development. Therefore, schools should cultivate students' positive concept of career and guide them to the correct direction upon the task and educational objective of career development. Besides considering the personal interests and competence, students should also recognize the talents needed the most by the country and the society in order to grasp every opportunity and properly decide the directions of advanced studies or occupation.

Swain planning model proposed by Swain (1989) is a common career planning model which functions as the criterion for the curriculum design of college students' career planning, including three main factors in the setting of goals in life and career: personal self-exploration, exploration of job and education and relationship between individuals and environment. The model consists of three triangles and one circle, with career decision-making is their direction connection. The circle is the core which refers to a person's goal of career; each triangle is the key of career exploration and planning. The content and model are shown in Figure 1.

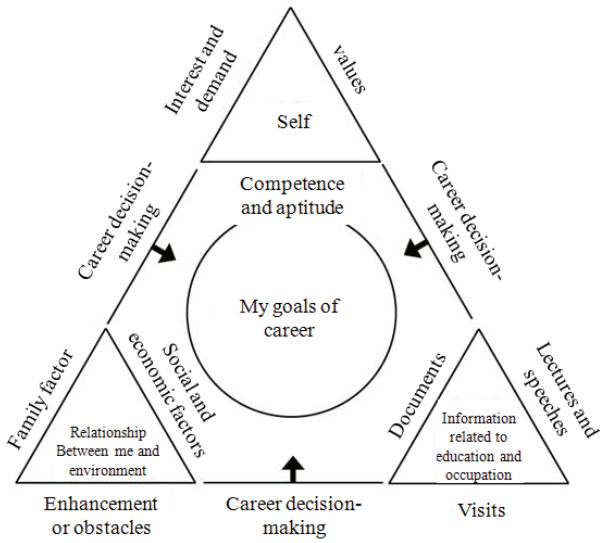

Figure 1. Swain Career Planning Model
Source: Swain. (1984).

In the figure 1, the triangles refer to the keys of career development and planning. Swain shows the complicated theory of career by simple and clear figures and constructs the framework of career planning. However, a person's different subjective judgments will lead to different career decisions and the goals of career will reveal a person's uniqueness and originality.

Career Decision-Making

In career development, people make different decisions at any time when facing different people, types of career and stages of career. Therefore, they should carefully explore and evaluate the information in career decision-making. This study generalizes the factors into career self-traits cognition, career information source cognition and job market environment cognition. After analyzing the theories and literatures on these factors, it is found that career self-traits (i.e. personality traits, job values, occupation interest, personal competence and occupation cognition), career information sources (i.e. colleagues, teachers' expectation, career guidance of schools and dynamic career information) and job market environment (i.e. social values, advanced studies, jobs and job market) have influences on students' career decision-making differently. However, since students are in different environments, the influences also vary. Thus, this study treats career self-traits cognition, career information sources and job market environment as the main variables of career planning cognition model to probe into the recognition of the students in technological universities and the influences of the factors on career decision-making. In addition, according to literature review, this study proposes one career planning cognition model of students of technological university

which is mainly based on Swain's career planning model for the curriculum design of college students' career planning and the content above as the base of the research framework. The figure is shown as Figure 2. The figure includes two parts: Career planning cognition and career decision-making level, as shown below.

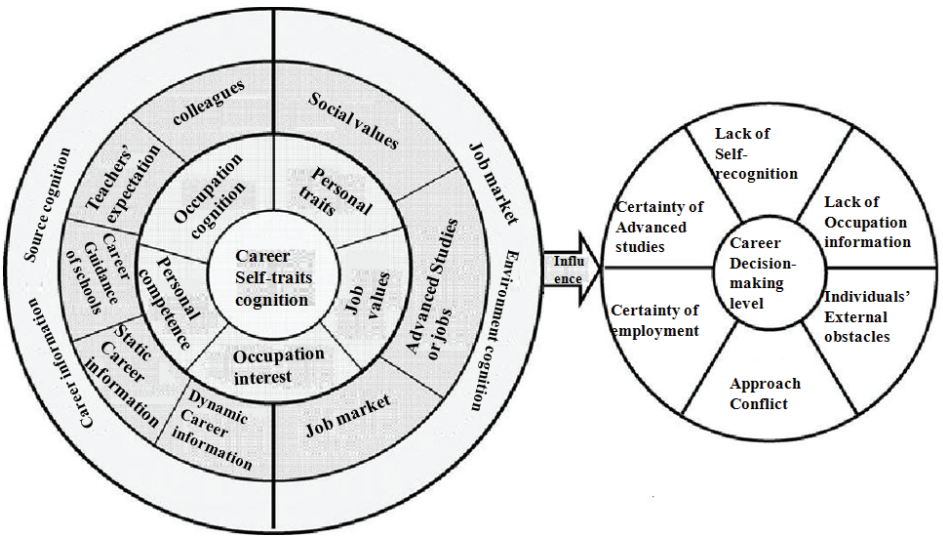

Figure 2. Students' Career Planning Cognition Model

Career Planning Cognition

The external circle refers to career information source cognition and job market environment cognition. The former includes colleagues, teachers' expectation, career guidance of schools, static career information and dynamic career information; the latter includes social value, advanced studies and jobs and job market. The center refers to the individuals' career self-traits cognition, including personality traits, job values, occupation interest, personal competence and occupation cognition.

Career Decision-Making Level

It includes the certainty of advanced studies, employment, lacking of self-recognition, occupation information, individuals' external obstacles and approach confliction. Certainty of advanced studies or employment means that the dimension of career decision-making is certain; lacking of self-recognition, occupation information, individuals' external obstacles and approach conflict indicate the uncertainty of career.

According to the figure, the above three factors of career planning cognition relatively influence the uncertainty of career. Thus, this study treats this model as the base of research framework and probe into students' career planning cognition and finds if it significantly influences career decision-making level as the criterion for students' career decision-making.

Research Design

This study aims to probe into technological university students' career self-traits cognition, career information source cognition and job market environment cognition in Taiwan. According to the literature review, it is known that there are relationships among career self-traits cognition, career information source cognition and job market environment cognition. Thus, this study suggests that treating career self-traits cognition, career information source cognition and job market environment cognition as the independent variables and career decision-making level as the dependent variable to find if there is significant correlation and influence.

Research Subjects

This study treated students of technological university in Taiwan as the population upon purposive sampling, and selected 372 seniors in colleges of humanity, engineering, design and management in public and private technological universities as the targets. Since the students were from places across Taiwan, the population was representative.

Research Tool

"Career self-traits cognition scale", "career information source cognition scale", "job market environment cognition scale" and "career decision-making level scale" of this study were the research tools.

About the research tool making, Holland's (1985) "theory of type" and Super's (1970) "job value scale" were used to make "Career self-traits cognition scale", "career decision-making level" scale was modified from the Career Decision-Making Scale (CDS) of Ospiow et al. (1976); "career information source cognition scale" and then "job market environment cognition scale" were designed by the researcher upon literature review.

The surveys were conducted on an anonymous basis, and scored based on Likert 5-point scale (5, 4, 3, 2 and 1).

After the return of the questionnaires, the invalid samples were eliminated first, and the valid samples were further encoded and filed. The data were analyzed by SPSS for windows. The reliability was based on Cronbach's α coefficiency from 0.75 till 0.88.

Statistical Analysis

This study validates the influence of independent variables on dependent variables by regression analysis, in order to find out the influence of career self-traits cognition, career information source cognition and job market environment cognition on career decision-making level, and to validate the relationships among the variables. The causal relation and direction among the variables are examined by Path Analysis, the collected data are analyzed by the enter method of multiple regression analysis. The path coefficients are acquired by the related approach, and the possible causal relationship among the variables is indicated by path diagram.

Research Results

Path Analysis of Cognition of Career Planning Cognition Factors on Career Decision-Making

This study further clarifies the causal relationship among the variables by path analysis, examines the collected data by the enter method of linear regression analysis, and obtains the path coefficients of the paths upon the method of regression coefficient. The results are shown in Table 1. The possible causal relationship among the variables is shown in Figure 3.

Table 1
Path Analysis Result of Main Variables

Model	Dependent variables	Independent variables	Coefficient	t value	F value	R^2
1	Career decision-making Level	Career self-traits cognition	-.319	-5.937***	22.276***	.154
		Career information source cognition	.191	3.704***		
		Job market environment cognition	.317	6.029***		
2	Career information source cognition	Career self-traits cognition	.237	5.225***	29.230***	.137
		Job market environment cognition	.166	3.185**		
3	Job market environment cognition	Career self-traits cognition	.379	7.878***	62.061***	.144

Note 1. Coefficients refer to path coefficients which are the normalized regression coefficients
Note 2. ** p<0.01, *** p<0.001

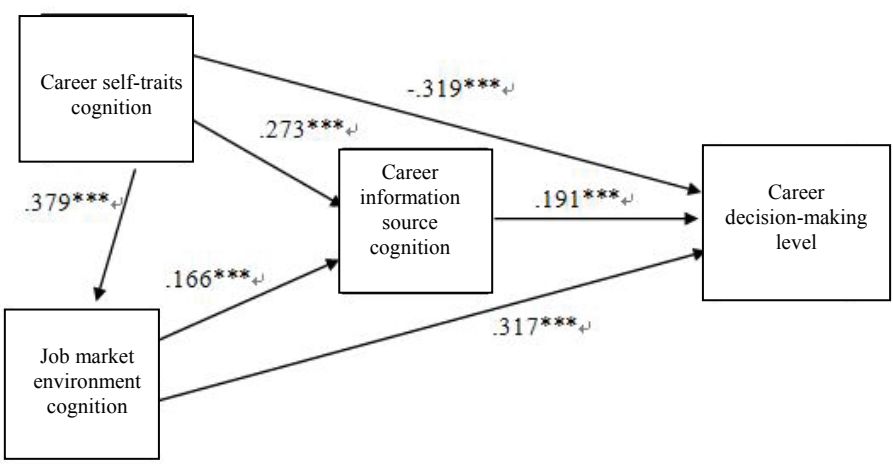

Figure 3. Main Paths of Path Analysis

Career self-traits cognition "directly" influences career decision-making level. The direct effect is -.319, indicating that the influence of career self-traits cognition on career decision-making is negative. In addition, the influence of career self-traits cognition on career decision-making is through job market environment cognition and career information source cognition. These two paths on career decision-making are "indirect effect." Job market environment cognition "directly" influences career decision-making level. The direct effect is .317. In addition, the influence of job market environment cognition on career decision-making is through the moderating variable (career information source cognition). Career information source cognition directly influences career decision-making level. The direct effect is .191. The results of path analysis, direct, indirect and total effects among the variables are reorganized in Table 3.

Table 2
Effect Analysis of Overall Causal Model

Dependent variables	Independent variables	Direct effect	Indirect effect	Total effect
Career decision-making level	Career self-traits cognition	-.319	.064	-.255
	Career information source cognition	.191	-	.191
	Job market environment cognition	.317	.032	.349
Career information source cognition	Career self-traits cognition	.273	.063	.336
	Job market environment cognition	.166	-	.166
Job market environment cognition	Career self-traits cognition	.379	-	.379

Note. The numbers mean of standard regression coefficiency in the path analysis

Based on the findings above, career self-traits cognition, career information source cognition and job market environment cognition reveal united prediction effect. Thus, Path Analysis model of this study is supported. With higher career self-traits cognition, students would have lower career decision-making level (lower career uncertainty). The reason is that when the participants recognize their career self-traits, such as types of personality traits, job values orientation, occupation interest preference, personal competence distribution and occupation cognition, they would know how to make decisions of career according to personal traits. Their self-efficacy and confidence would be enhanced.

With higher career information source and job market environment cognition, the students would have higher career decision-making level (higher career uncertainty). The reason is that the participants acquire the career related information from colleagues, teachers, career guidance of schools, dynamic and static career information; however, they do not analyze and compare the information and eliminate the useless one. Thus, they abuse the career information and cannot make the decisions; also, they may wrong recognize social values, opportunities of advanced studies or employment, trend of jobs,

application of positions and economy, and thus, have difficulty in career decision-making.

Conclusions

Analysis of integrated model of career planning cognition on career decision-making demonstrates that career planning cognition can predict career decision-making, career self-traits, career information source, job market environment cognition. Integrated model of career decision-making levels can be indicated to analyze students' career planning cognition and career decision-making. According to the result of integrated model analysis of career planning cognition on career decision-making, career planning cognition factors can directly influence career decision-making. It meets Swain's career planning model and three main factors in the setting of goals for career decision-making, including a person's self-exploration, exploration of jobs and education and relationship between individuals and environment. It refers to career self-traits cognition, career information source cognition and job market environment cognition in this study. Therefore, when probing into career decision-making, the study should generalize the common aspects of the classified things or concepts with regard to the influences and relationships among career self-traits, career information sources and job market environment cognition.

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