A Case Study on the Effect of Teaching Innovation on Learning Effectiveness: Using a Moderator of "Integrating Information Technology into Teaching"

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ABSTRACT

*This study primarily aims at the effect of teaching innovation on learning effectiveness in a certain t*echnical-*v*ocational *university/college in Taiwan with integrating information technology into teaching as a moderator. The sample population of the research was the teachers (above lecturers) and the students of a certain v*ocational & technical *university/college in Taiwan. Convenience sampling was used. Structural Equation Modeling (SEM) was used to verify this research's overall model and its structural model and to measure the model's goodness-of-fit. Then, the study aims at the path coefficient among the "implicit variables" (or called latent variables) of the structural model using t-test to determine whether the moderating effect of the model was significant. The research results showed that (1) Teaching innovation has a positive, direct and significant effect on students' learning effectiveness (2) Integrating information technology into teaching had a significant, positive effect on learning effectiveness and; (3) Teaching innovation and integrating information technology into teaching have an interaction effect with respect to learning effectiveness.*

Keywords: *teaching innovation, integrating information technology into teaching, learning effectiveness, moderator*

RESEARCH BACKGROUND AND PURPOSES

The 21st century is a new era of rapid development of information technology and of social diversity. It has also contributed to the arrival of the knowledge-based economy. In order to meet the challenges of the knowledge-based economy, talents with the capabilities of critical thinking and innovation need to be developed. Innovation, problem-solving, critical thinking, and the ability to apply information technology are all important basic capabilities in the new education for the era of knowledge-based economy. Former U.S. President Bill Clinton said the knowledge-based economy is "science and technology as fuel, innovation as power" (Yu-Chi Su, 2002; Chiu-Meng Wang, 2003). Creativity is the flames of innovation. Thus, creativity education has become the promotional focus of future education works. Developing talents with creativity has become an important goal of educational reform and development of countries in the world.

When challenging the global competition, innovation is an assurance to elevate competitiveness, and innovation must cultivate creativity through education so teachers and students can be repeated with creativity. With "a nation of creativity" as a vision in January 2002, Taiwan's Education Department announced "the white paper on creativity education." It defined the role of creativity in the educational reform making an all-out effort to promote creativity education. It proclaimed its commitment to creativity education as the focus of educational reform throughout the future. Thus, to enable students to be creative, teachers' instruction must be innovative and creative. "Teaching" must be able to improve the

“innovative” capability of the “learners.” Thus, "teaching innovation" is the top priority with an emphasis to be carried out. School teaching must adjust to the need of social development, replacing the teaching modes that are too rigid with modern means of teaching, interactive teaching methods, and individualized teaching content to develop the learners' innovative spirit and capabilities so that they are able to think independently when faced with problems, making judgements and solving them, enabling them really to possess “portable” skills.

Overall, although the researchers' level of study on teaching innovation, integrating information technology into teaching, and learning effectiveness may differ slightly due to different research issues, the levels included were nothing more than the following: learning environment, administration, teachers, curriculum, learning outcomes, etc. Compared to other levels, research of impact of teaching innovation on learning effectiveness – with integrating information technology into teaching as the intervening variable is considered novel. However, the constant renewal of teaching methods and the integration of information technology into teaching shall bring a relatively effective foundation between teaching and learning for teachers and students. In addition, students' willingness to learn and their learning effectiveness can be enhanced. This study was planned to be based on past domestic and foreign scholars' exploratory research, and attempted to verify and understand whether there was an interaction effect of teaching innovation and integrating information technology into teaching with respect to students' learning effectiveness in a certain technical-vocational university/college in Taiwan. Therefore, the specific purpose of the study can be summarized as follows:

1. To verify and understand whether teaching innovation has a significant, direct, positive effect on learning effectiveness of a certain technical-vocational university /college in Taiwan.
2. To verify and understand whether teachers' integration of information technology into teaching has a significant, positive effect on learning effectiveness in a certain Taiwan's technical-vocational university /college.
3. To verify and understand whether teaching innovation and integration of information technology into teaching have a positive and significant interaction effect on learning effectiveness in a certain Taiwan's technical-vocational university/college.
4. The results of this research and analysis can be used as a reference when university/college teachers are developing teaching methods.

LITERATURE REVIEW

Teaching Innovation

When it comes to teaching innovation, according to Bruce (1989), "learning" occurs in the interaction between the "learner" and the "learning environment," when the appropriate strategies and skills were applied to use technology making it a favorable tool for teaching, then a better teaching effectiveness can be developed. Ching-Shan Wu's (2002) research pointed out teaching innovation is, during the teaching process, the teachers using multi-faceted and lively teaching methods and diversified and rich content to stimulate students' inner interest in learning, thus, developing students' attitude in proactive learning and enhancing students' learning ability. I-Min Lin (2002) believed that teaching innovation is teachers having an open mind, having the ability to reflect on teaching, and being able to use the cogitation of reflection, questioning, deconstruction and reconstruction to guide students to learn correctly, to develop students' critical thinking and creative capabilities. Teachers can also apply the characteristics of moral virtue and positive traits that they have experienced to have a subtle effect on the

students. Thus, establishing a good moral character and a positive outlook on life for students. According to the definition of ERIC Thesaurus, “teaching innovation” means the “introduction of new teaching ideas, methods, or tools,” while “creative teaching” is the “development and the use of novel, original, or inventive teaching methods.” In a narrow sense, teaching innovation relatively tends to mean applying new teaching concepts, methods, or tools developed by others or oneself, while creative teaching tends to mean applying the teaching methods or tools developed by oneself that can stimulate the interest of learning. Broadly speaking, there are many similarities in the sense of teaching innovation and creative teaching. Consolidating the views of the above-mentioned scholars, this research regards creative teaching to be the same as teaching innovation and defined its conceptual definition as “teachers having creativity in the preparation before teaching, in the process of teaching and student assessment, being able to reflect on, to design and apply new, diverse teaching methods or activities, understanding individual differences of students, stimulating students learning motivation and interest, enhancing students' learning effect.” This research separated “teaching innovation” into two secondary dimensions and their operational definitions are explained as follows:

A. Innovation of teaching methods: It means teachers using new and meaningful methods, for example, the application of cloud technology, conducting online education, or the use of electronic whiteboard to solve teaching problems, and being able to bring the teachers' creativity into play.
B. Innovation of course design: It means to implement innovative course design that inspires students to integrate knowledge with a practical, flexible innovative ability, enables them more to make a substantial contribution to the relevant areas in the future.

Integrating Information Technology into Teaching

Shih-Chuan Wang (2000) believed the evaluation of integrating information technology into teaching can be focused on people (referring to information attainment) and materials (referring to information environment). “People” refers to the information attainment of the teachers, the students, and the information management personnel. “Materials” refers to the information environment such as computer classrooms, computers in the classrooms, campus network, digital teaching materials, and teaching software, etc. These are all factors that affect whether integration of information technology into teaching will be successful.

In the research of primary school teachers' concerns about the changes and the related factors on integrating information technology into teaching, Li-Neng Chiang (2002) believed (1) The developing direction of the school's information education; (2) The attitude of the principal and the directors; (3) Whether the teachers participate in the promotion and decision-making of integrating information technology into teaching and; (4) Whether the principal, directors, and teachers have a consistent attitude, etc. are factors that affect the promotion of integrating information technology into teaching.

Yu-Lung Chen (2000) believed the most critical factors are whether schools' computer software and hardware are sufficient, whether the planning of the computer teaching environment is appropriate, whether the installation of classroom computer is widespread, whether the resources of teaching materials is abundant, and whether the information attainment of the teachers and student alike is sufficient.

In addition, Chih-Hsien Wu (2002) believed the influencing factors can be classified into external environment and internal factors in the research on the teachers' attitude of integrating the Internet into teaching, the teaching behavior of integrating the Internet into teaching and their related factors. The former included the installation of computer hardware, software, administrative support from the school, the support of professional technology, the support of the colleagues, the arrangement of class schedule,

students' information attainment, etc. And the latter included teachers' ability to integrate information technology into teaching, teachers' motivation, willingness, self-efficacy, and teachers' nature of innovation, etc. Summarizing the above, this research separated the variable of "integrating information technology into teaching" into two observable dimensions: the use of electronic whiteboard or slides and the application of a computer teaching platform.

Learning Effectiveness

Learning effectiveness means the changes in knowledge, skills, and attitude of the learners after the completion of teaching. (Kui-Fa Chiu, 1992; Piccoli, et al, 2001). The research by Jones (1996) indicated that learning effectiveness will be affected by learning styles, course design, teaching, and other factors. Loo's (1999) research also believed that learning performance will be affected by learning styles, course design, teaching, and other factors. As far as the evaluation of learning effectiveness is concerned, whether the learning effectiveness is good can be determined from students' school grades, ability to obtain professional certificates, and the performance in the participation of various external exams. Therefore, the conceptional definition of "learning effectiveness" of this research is "to use the three explicit variables such as the achievements of students' school grades after studying in school, professional skills demonstrated, and the capability to participate in various external exams, etc. as the indicators of measurement for learning effectiveness," and briefly described its operational definition as follows:

A. School grades: It refers to the test scores after studying in the school and having gone through the school learning process.
B. Number of professional certificates: It refers to the number of professional certificates obtained in various professional proficiency tests after going through the process of either learning in schools or other capability learning.
C. External examinations: It refers to the process of students participating in various external professional proficiency tests after either learning in school or other professional learning.

Teaching Innovation and Learning Effectiveness

Teaching innovation means the teachers having creativity, being able to reflect on, to design and to apply new, diverse teaching methods or activities, understanding individual differences of students, stimulating students learning motivation and interest, enhancing the students learning effectiveness in the preparation before teaching, in the process of teaching and in student assessment (Shu-Mei Chen, 2010). In short, teaching innovation is teachers having creativity and showing vivid and lively teaching methods to make students interested in learning, thus enhancing the teaching effectiveness of teachers. The purpose of teaching innovation in the students' area: (1) Developing students' capabilities in independent analysis, thinking and judgement; (2) Stimulating students' interest and motivation for learning ; (3) Tapping the students' potential in creativity and problem solving; and (4) Enhancing students' learning ability. In the teachers' area: (1) Enhancing teaching quality and effectiveness; (2) Having rich and diverse teaching content and methods; (3) Having a diversified student assessment and; (4) Achieving educational goals and ideals (Chen-Wan Chiu, 2000; Ching-Shan Wu, 2002; Chi-Cheng Chang and Chiu-Meng Wang, 2008). From the above inference, the following hypothesis can be obtained:

Hypothesis 1 (H_1): Teaching innovation has a significant, positive, direct effect on learning effectiveness.

Integrating Information Technology into Teaching and Learning Effectiveness

Bitner & Bitner (2002) emphasized teachers themselves play a key role in whether integrating information technology into teaching will be successful. Other than the prerequisite of selecting appropriate hardware and suitable teaching software, the application skills and attitude of teachers in information technology are the decisive factors of whether integrating information technology into teaching will be successful. Strehle & Hausfather (2002) also reached the same conclusion.

Moersch (1995) indicated that to achieve success, teachers must be able to combine information technology with courses and teaching, and be willing to try to change the teaching methods. However, actual implementation depends on teachers' feelings, skills, and attitude toward information technology. In addition, teachers' beliefs and skills deeply affect whether the integration of information technology into teaching will be successful.

The research analysis of Leggett & Persichitte (1998) showed five important factors in the obstacles for teachers to implement technology in the past 50 years: time, expertise, access, resources, support, etc. This research considered that if the teachers can overcome these factors when integrating information technology into teaching, then there will be a positive effect on students' learning effectiveness. Thus, this research proposed the following hypothesis:

Hypothesis 2 (H_2): Integrating information technology into teaching has a significantly positive effect on learning effectiveness.

Teaching Innovation, Integrating Information Technology into Teaching, and Learning Effectiveness

Today's teachers, whether in the spirit of teaching, course design, teaching materials and teaching methods, and student assessment need to constantly innovate and integrate with information technology to re-create teaching. Therefore, teachers should understand what integrating information technology into teaching is (Jonassen, 2000). While integrating information technology into teaching is to merge information technology with course objectives, teaching materials and teaching activities. It enables information technology to become an indispensable teaching or learning tool. It makes the application of information technology become part of the teaching activity in the classrooms. In addition, it extends information technology as a mean or a process that can find the solution to a problem any time, any place (Chuan-Shih Wang, 2000b). According to Hsiao-Hsuan Wang's (2002) research, integrating information technology into teaching can make learning more diversified and individualized. It enhances the learning effectiveness. The research done by Jung-Kui He (2002) indicated integrating information technology into teaching is a lively and creative way of teaching.

In addition, Yung-Chin Yen and Jung-Kui He (2001) believed integrating information technology into teaching could enhance learning effectiveness. However, the main body is still the course content and the teaching activities. Information technology is only one of the supporting tools.

Jones & Paolucci (1999) believed that technology can enhance student’s motivation in learning and achievement. According to the research of Hoffman (1996), integrating information into teaching is the best choice for teachers to improve teaching methodology and teaching skills. It can also help teachers in problem solving and innovative teaching. But it's not an easy task to really implement the integration of information technology into teaching. It requires a lot of conditions of cooperation. As a result, certain problems maybe encountered when implementing the integration of information technology into teaching. For example, man-made problems, environmental issues, funding issues, timing issues, course issues, and integration issues (Dockstader, 2002). If these problems can be overcome, then teaching innovation and

integrating information technology into teaching can have a positive effect on learning effectiveness. Therefore, this research obtained the following hypothesis:

Hypothesis 3 (H_3): Teaching innovation and integrating information technology into teaching have a significantly positive effect on learning effectiveness. In other words, when Hypothesis 1 (H_1) and Hypothesis 2 (H_2) are valid, integrating information technology into teaching has a moderating effect.

Based on the Above Research Purpose and Literature Review, the Research Framework Can be Obtained as Shown in Figure 1.

Figure 1: The research framework

RESEARCH METHODOLOGY

Sampling Methods

This research used convenience sampling to target teachers (lecturers or above) and students in a certain vocational & technical university/college in Taiwan to conduct the questionnaire survey. This research disseminated 50 sets of an expert questionnaire as a pilot test. Revisions were made according to the improvement suggestions made by the experts. Post tests were then conducted. 180 sets of questionnaire were formally disseminated. There were 157 valid samples, a sample recovery rate of 87.2%.

Questionnaire Design

The questionnaire design of the research followed each observable dimension. The "multi-dimension measurement" method was applied. Likert seven-point scale method was adopted for the measurement of the questionnaire. A 7 to 1 score was given according to the extent of agreement and

disagreement. 7 points indicates “extremely agree” and 1 point indicates “extremely disagree” which the higher the score, the higher the degree of agreement and vice versa.

The questionnaire design of teaching innovation combined and improved the research by Chuan-Shih Wang (2000a), Chuan-Shih Wang (2000b), Budin, H. (1999), Wang, C. S. & Li, C. C.(2000), etc. And the latent variable included two variables: innovation of course design and innovation of teaching methods. The questionnaire was designed according to “multi-dimension measurements”. There were four questions for each variable, a total of 8 questions.

The questionnaire design of integrating information technology into teaching combined and improved on the research done by Chiu-Meng Wang (2003). The variable also includes the following two variables: electronic whiteboard or slides and Internet teaching platform. There were four questions for each variable, a total of eight questions.

The questionnaire design of learning effectiveness combined and improved on the research done by Jones (1996), Lynch (1998), etc. Thus, there were three variables in the latent variable: school grades, number of professional certificates, and external exams, etc. The questionnaire was designed according to “multi-dimension measurement”. There were four questions for each variable, a total of 12 questions.

Questionnaire Data and Measurement System

In order to verify the research framework proposed by this study, structure equation modeling (SEM) was adopted to conduct the confirmatory factor analysis (CFA) for the research model framework. This study separated the questionnaire into three latent variables: teaching innovation, learning satisfaction, and learning effectiveness. Each latent variable was separated into the following observable/explicit variables. There were a few questions for each observable/explicit variable in the survey. The data collected from the investigation was then processed, and the original questionnaire data files were established. As for the establishment of measurement system for this research model, even though questionnaire was designed by the method of “multi-dimension measurement”, taking into account the easier processing by computer software, the “odd-even measurement” method was utilized to conduct the measurement (Shun-Yu Chen, 2010). Table 3.1 shows the number of questions in questionnaire and reference sources of implicit variables and explicit variables of this study.

Table 3.1: The number of questions of “implicit variable” and “explicit variable” in the questionnaire

Implicit Variables	Explicit Variables	Number of questions	Questionnaire references
Teaching innovation (X)	Innovation of teaching methods	4	Chuan-Shih Wang (2000a), Chuan-Shih Wang (2000b) , Budin, H. (1999), Wang, C. S. & Li, C. C.(2000)
	Innovation of course design	4	
Integrating information technology into teaching (Mo)	Electronic whiteboard or slides	4	Chiu-Meng Wang (2003)
	Internet teaching platform	4	
Learning effectiveness (Y)	School grades	4	Jones(1996), Lynch(1998)
	Number of professional licenses	4	
	External exams	4	

RESULTS AND ANALYSIS

Analysis of Linear Structural Model

Confirmatory factor analysis (CFA) is an analysis method relative to exploratory factor analysis (EFA). This research conducted confirmatory factor analysis (CFA) on the three implicit variables (latent variables): "teaching innovation", "learning satisfaction", "learning effectiveness." The structural equation modeling (SEM) includes structural model and measurement model. It can effectively solve the cause and effect relationship between implicit variable and latent variable. In addition, the model confirmed by this research includes three parts: This is, (1) Confirming the goodness-of-fit of the measurement model. (2) Verifying the goodness-of-fit of the structure model and (3) Verifying whether the goodness-of-fit of the complete model is consistent with the goodness-of-fit indicator. That is, applying related goodness-of-fit index to determine the overall fit of the SEM mode. (Diamantopoulos & Siguaw, 2000).

Analyzing the Goodness-of-Fit of the Measurement System

The factor loading of each latent/implicit variables and manifest/explicit variables was mainly to measure the strength of the linear correlation between the manifest variables and latent variables (explicit and implicit variables). The closer the factor loading was to 1, it means the explicit variables were more able to measure the implicit variables. The factor loading of each explicit variable of this research was between 0.7 and 0.9. This indicated that it had an excellent reliability. Therefore, the "manifest variables" (that is, explicit variables) within this model's "measurement system" can all adequately measure the "latent variables" (that is, implicit variables) respectively. In addition, average variance extracted (AVE) is used to calculate the variance explanation capability of implicit (latent) variables with respect to each explicit variable. The higher the VE value of the latent variable (that is, the implicit variable), the higher its reliability and convergent validity are. Generally, VE value should be greater than 0.5. That is, the variation that can be explained of the explicit/observable variable is greater than the measurement error (Fornell and Larcker, 1981). The AVE of this study were all greater than 0.5. This indicated that the explicit variables have a very high reliability and convergent validity (Table 4.1 and Figure 4.1).

Table 4.1: Judgement indicators of measurement system within the model

Latent variable (Implicit variable)	Manifest variable – centralized dual measurement	Factor loading	Variance Extracted, VE
Teaching innovation (X)	X1C	0.86	0.63
	X2C	0.87	0.59
Integrating information technology into teaching (Mo)	Z1C	0.81	0.58
	Z2C	0.84	0.57
X*Mo	X1Z1C	0.79	0.56
	X2Z2C	0.81	0.56
Learning effectiveness(Y)	M1C	0.83	0.57
	M2C	0.85	0.58

Analyzing the Good-of-Fit of the Structural Model

Path Analysis Results of the Structural Model

After the confirmation of the goodness-of-fit of the model, this research results are listed in Table 4.2: Parameter estimate of each implicit variable, standard error (S.E.) among implicit variables, and critical ratio (C.R.), etc.

Table 4.2: Path analysis results of the structural model

Path coefficient between implicit variables			Estimate	S.E.	C.R.	P	Label
Teaching innovation (X)	→	Learning effectiveness (Y)	.541	.031	17.451	***	a
Teaching innovation (X)	→	Integrating information technology into teaching (Mo)	.432	.021	20.571	***	b
X*Mo	→	Learning effectiveness (Y)	.663	.022	30.136	***	c

Note: * indicates P<0.05; ** indicates P<0.01; *** indicates P<0.001

The Coefficient of Determination

The R^2 value (Squared Multiple Correlation, SMC) as shown in Tables 4.4.1 and 4.4.2, is the degree of explanation of each "independent" implicit variable with respect to each "dependent" implicit variable.

Table 4.4.1: Coefficients[a, b] 【Hierarchical Regression】

Model	R	R^2	**Adjusted R^2**	Sid. Error of the Estimate	Change Statistics				
					R^2 Change	F Change	df1	df2	Sig. F Change
1	.887[a]	.787	**.783**	6.916	.787	179.218	2	97	.000
2	.895[b]	.802	**.795**	6.711	.015	7.024	1	96	.009

a. Predictors: (Constant), Mo and X

b. Predictors: (Constant), Mo, X and Mo*X

Data in Table 4.4.1 was extracted to become Table 4.4.2 as follows:

Table 4.4.2: Coefficientsa

Coefficients of Determination	R^2
Teaching innovation (X), integrating information technology into teaching (Mo) with respect to learning effectiveness (Y)	.783
Teaching innovation (X), integrating information technology into teaching (Mo) and X*Mo with respect to learning effectiveness (Y)	.795

The Goodness-of-Fit Analysis of the Overall Model

The linear structural equation modeling (SEM) was applied to accomplish the purpose of model building for the research, to study the relation among the latent variables and whether the measurement system has the measurement reliability, and the overall goodness-of-fit was measured for this research. The overall goodness-of-fit indicators used to measure this research were χ^2, d.f., GFI, AGFI, NFI, CFI, RMR, RMSEA, etc. Generally, χ^2/d.f. <5; 1>GFI>0.9; 1>NFI>0.9; 1>CFI>0.9; RMR<0.05; RMSEA<0.05 (Bagozzi & Yi, 1988). The goodness-of-fit for the overall model of research was χ^2/d.f. <5. GFI, AGFI and NFI were all greater than 0.90, and RMR value was smaller than 0.05. It showed that this research's goodness-of-fit of the overall model was good, as indicated in Table 4.4.

Table 4.4: Evaluation table of the overall model fit

Determination index	χ^2	DF	GFI	NFI	AGFI	CFI	RMR	RMSEA
Fit value	5.970	6	.902	.934	.906	.931	.023	.035

Standardized Results of the Linear Structural Equation Modeling, SEM

The entire framework of the standardized results after computer execution is shown in Figure 4.1

Figure 4.1: Standardized results of SEM analysis

The Verification of the Path Effect Analysis of the Structural Model

As to the verification of this research's intervening variable, a hierarchical regression analysis was first carried out (as in Table 4.4.1), then the regression analysis and t-test of centralized Y against X, Mo, X*Mo were conducted to examine whether the significance of partial regression coefficient c exists (i.e., whether c is equal to 0). The results are shown in Tables 4.5.

Table 4.5: Coefficients

Model		Unstandardized Coefficients	Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	3.807	4.180	.587	3.911	.000
X	9.753	.903	.483	4.951	.000
Mo	6.875	.421	.671	17.344	.000
2 (Constant)	22.036	10.561	.651	4.086	.000
X	3.197	2.625	.541	5.351	.000
Mo	1.373	2.116	.432	20.368	.000
X*Mo	1.407	.531	**.663**	26.837	.000

Note: Dependent Variable: Organizational Effectiveness(Y)

From Table 4.5 above, we can see the path coefficient of Mo*X versus Y is 0.663. Thus, Mo*X has an intervening effect on Y.

According to the above analysis, this study obtained the following verified results:

1. Teaching innovation had a positive, significant effect on students' learning effectiveness. The standardized path coefficient was 0.541. Thus, Hypothesis 1 (H_1) obtained support. (The hypothesis is valid)
2. Integrating information technology into teaching had a significant, positive effect on learning effectiveness. The standardized path coefficient was 0.432. Thus, Hypothesis 2 (H_2) obtained support. (The hypothesis is valid)
3. Teaching innovation and integrating information technology into teaching had a significant interaction effect on learning effectiveness. The standardized path coefficient was 0.663. Thus, Hypothesis 3 (H_3) obtained support. (The hypothesis is valid)

CONCLUSIONS AND SUGGESTIONS

Conclusions

Through the analysis of the above data and results, the following conclusion has been obtained:

1. In terms of the verification of SEM model, there was a goodness-of-fit among the measurement model, structural model, and the overall structure of the linear structural equation model (SEM) built for this case study. It showed there was a goodness-of -fit of this model.
2. In terms of practice verification:
   (1) In terms of the relational dimension of teaching innovation and learning effectiveness, teaching innovation in a certain Taiwan's vocational & technical university/college will have a positive and significant effect on learning effectiveness.
   (2) In terms of the relational dimension of integrating information technology into teaching and learning effectiveness, integration of information technology had a positive and significant effect on learning effectiveness in a certain Taiwan's technical-vocational university/college.
   (3) In terms of the relational dimension of teaching innovation and the integration of information technology into teaching with respect to learning effectiveness, teaching innovation and the integration of information technology into teaching had a significant interaction effect on learning effectiveness in a certain Taiwan's technical-vocational university/college.

From the above mentioned , while teaching innovation and integrating information technology into teaching have significantly positive effect on learning effectiveness, integrating information technology

into teaching has a moderating effect which is much more significant instead of conclusions 1&2 (5.1.2) in this study.

Contribution of the Case Study

1. Innovation of Research Methods

According to past literature reviews, most multi-regression analyses were applied in exploratory research with less consideration given to the moderating effect of implicit variables and the research framework of Confirmatory Factor Analysis. Major constructs of the study topic are implicit variables where multi-regression is not an appropriate analysis for such instead, it is necessary to use Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) respectively for a measurement tool and model framework in this case study; therefore, this study has used quite innovative research methods.

2. As for practical interest:

Scholars were inclined to stress Exploratory Factor Analysis (EFA) in their past research topics. Now, this study combines prior relevant research results from those scholars and sets up its modeling and verification of goodness-of-fit of the model to understand whether such a model possesses excellent goodness-of-fit effects or not. So, the topic of this study is an important practice of Confirmatory Factor Analysis (CFA) worthy of further research reference for related fields of studies in the future. As well as this, the results can be for the case university administration reference to set up strategies for Teaching Innovation; therefore, this study provides a most valuable reference.

Restrictions and Suggestions

1. Due to limited research resources, this study adopts non-probability convenience sampling, which uses this base of convenience to select samples only giving consideration to access or measurement convenience; however, it might make greater sampling bias so that the reliability of results will be inclined to be worse. The suggestion is made to upcoming researchers that they can use alternative Simple Random Sampling or Stratified Random Sampling Methods for sample selection.
2. This study is a Confirmatory Factor Analysis (CFA). It should best design a simple verification model while modeling to prevent it from becoming a complicated model producing poor goodness-of-fit (Shun-Yu Chen, 2010). Hence, this study only considers the influence of Teaching Innovation on Learning Effectiveness, and uses Integrating Information Technology into Teaching as a moderator.
3. This study is limited to Confirmatory Factor Analysis (CFA) for this case. In the future, upcoming researchers can consider expanding their fields or verifying different businesses by comparison between various businesses in the same model to make different goodness-of-fit.

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