A study on the effect of teaching innovation on learning effectiveness with learning satisfaction as a mediator

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ABSTRACT: This research is primarily focused on the effect of teaching innovation on learning effectiveness in a certain technical-vocational college in Taiwan, with the students' learning satisfaction as the mediating variable. The sample population of the research was the student body of a t echnical-vocational college in Taiwan. Convenience sampling was used to take the samples. Structural Equation Modelling (SEM) was used to verify the research overall model, its structural model, and to measure the model's goodness-of-fit. Bayesian estimation is used to test whether the direct effect, mediating effect and overall effect of the model was significant. The research results showed that teaching innovation has a positive, direct effect on students' learning effectiveness, but it was insignificant. Secondly, teaching innovation has a significant, positive effect on learning satisfaction. Students' learning satisfaction has a significant, direct effect on students' learning effectiveness. In summary, students' learning satisfaction has a *complete* mediating effect.

INTRODUCTION

Faced with a rapidly changing society, innovation has become a necessary capability in life. Former US President Bill Clinton said the knowledge-based economy is *science and technology as fuel, innovation as power*. As pointed out by Su, in the new education in the era of the knowledge-based economy, basic capabilities such as innovation, problem solving, critical thinking and the ability to apply information technology, are all important for future citizens [1]. Creativity is the creative flame of innovation. Thus, creativity education has become the essence of future education. Developing talents in creativity has become an important goal of educational reform and economic development for all countries in the world.

When challenged by global competition, innovation is an assurance to enhance competitiveness, and creativity/ innovation can be greatly cultivated through education. With *a nation of creativity* as a vision in January 2002, Taiwan's Ministry of Education published The White Paper on Creativity Education. It defined the role of creativity in educational reform as making an all-out effort to promote creativity education. It proclaimed its commitment to creativity education as the focus of educational reform in the future. Thus, to enable students to be creative, teaching must be innovative and creative so as to improve the learner's innovative capability. Thus, *teaching innovation* was the top priority mission. School teaching must adjust to the need of social development, replacing teaching modes that are too rigid with modern means of teaching, interactive teaching methods and customised teaching content to develop the learners' innovative spirit and capabilities, so that they are able to think independently when faced with problems and make judgments to solve them (enabling them to possess *portable* skills).

The major factors that affect learning effectiveness are learning satisfaction and teaching innovation. There are many factors that affect the students' learning satisfaction and learning effectiveness. Other than a student's personal factors, factors such as teachers, courses and learning environment, all may have an impact. Researchers focus on different influencing factors depending on varied research purposes or research environments. Lynch et al focused on the study of the influence of learning styles on learning effectiveness and their relationships for medical students [2]. Jones also studied how capability, self-efficacy and personal goals affected effectiveness [3]. The results showed learning effectiveness indeed was affected by some personal characteristics.

Overall, although the researchers' concern of the effects of study on learning satisfaction and learning effectiveness may differ slightly due to different research issues, the factors studied were the following six: learning environment, administration, teachers, curriculum, learning outcomes and interpersonal relationships. Compared with other factors, the study of the impact of teaching innovation on learning effectiveness - with students' learning satisfaction as the mediating effect - is considered novel. However, the constant renewal of teaching methods, the continued presence of students' learning satisfaction and the effective development of student learning, can all lay the foundation for

effectiveness between teaching and learning in schools. In addition, student willingness to learn and its effectiveness will be enhanced. Thus, this study tried to verify and understand the impact of teaching innovation on learning effectiveness - with learning satisfaction as the mediating variable - at vocational and technical schools/colleges in Taiwan. The specific purpose of the study can be summarised as:

1. To verify and understand whether teaching innovation has a significant, direct, and positive effect on learning effectiveness at vocational and technical schools/colleges in Taiwan.
2. To verify and understand whether teaching innovation has a significant and positive impact on learning satisfaction and whether learning satisfaction has a significant and positive impact on learning effectiveness in Taiwan's vocational and technical schools/colleges. In other words, when the above Point 1 is valid, does the learning satisfaction have a *partial* mediating effect?
3. The results of this study and analysis can be used as a reference when school teachers are developing teaching methods.

LITERATURE REVIEW

Teaching Innovation

When it comes to teaching innovation, according to Bruce, learning occurs in the interaction between the learner and the learning environment; when the appropriate strategies and skills are applied to technology use, making it a favourable tool for teaching, then better teaching effectiveness can be developed [4]. Wu pointed out that teaching innovation (during the teaching process) is when teachers use multi-faceted and lively teaching methods, and diversified and rich content to stimulate students' inner interest in learning, thus, developing positive student attitudes toward proactive learning and enhancing students' learning ability [5]. Lin believed that teaching innovation involves teachers having an open mind, having the ability to reflect on teaching and being able to use the cogitative skills of reflection, questioning, deconstruction and reconstruction to guide students to learn correctly and to develop students' critical thinking and creative capabilities [6].

Teachers can also apply the characteristics of moral virtue and positive traits that they have experienced, to create a subtle effect on the students, thus establishing 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 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 interest in 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 study regards creative teaching to be the same as teaching innovation and defines 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, and enhancing the effect of learning*. This study separated *teaching innovation* into two secondary dimensions and their operational definitions are explained as follows:

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

Learning Satisfaction

Learning satisfaction is one of the major items to measure learning achievement. In addition to students' personal factors, learning satisfaction can be affected by teachers, courses, the learning environment, and other factors. Long has it been believed that the main goal of adult learning is learning achievement and satisfaction [7]. Tough pointed out satisfaction is the feelings and attitude of students toward their learning activities [8]. Feeling happy or having a positive attitude means satisfaction. Instead, feeling unhappy or having a negative attitude means dissatisfaction. Starr pointed out that the measurement questionnaire of students' learning satisfaction consists of five levels: school environment and equipment, learning achievement, administrative measures and services, interpersonal relationships, and students' respect for teachers and administrative staff [9].

Corts et al used five environmental factors to study how they affected student satisfaction. The research results showed: career preparation and course offerings affected student satisfaction the most. Advising has a positive impact on student satisfaction [10]. The research results of Teven and McCroskey showed: teachers' concern for students has a positive

impact on learning: it also improved students' evaluation of teachers [11]. Baker et al studied the impact of teacher-student interaction on satisfaction with the school [12]. The study found that when teachers cared for and supported students, this had a positive effect on the students' evaluation of satisfaction with the school. Gaziel's study found that: the order of the school culture that affects school effectiveness was academic emphasis, continuous school improvement, and rules [13]. Scholars have different views and research results regarding the methods to measure learning satisfaction. Consolidating the views of the above-mentioned scholars, *learning satisfaction* has been conceptually defined as the *pleasant feelings or attitudes of students toward learning activities*. The operational definition of *latent variable* for learning satisfaction is described below. It was separated into three manifest variables to study:

A. Learning attitude: refers to a relatively stable psychological tendency shown by students toward learning and the learning environment. It can usually be determined and described according to how students treat certain aspects, such as attention to the situation, emotional status and the condition of willpower.
B. Learning motivation: refers to the power that encourages people to learn. Learning motivation is directly related to whether students are learning actively, what they are willing to learn, and how well they are learning.
C. Interest in learning: refers to students' understanding of the learning object itself and the tendency to seek contact with positive emotions. It is the driving force that encourages active learning.

Learning Effectiveness

Learning effectiveness means the changes in knowledge, skills and attitude of the learners after the completion of teaching [14-15]. Jones indicated that learning effectiveness will be affected by learning styles, course design, teaching and other factors [3]. Loo also believed that learning performance will be affected by learning styles, course design, teaching and other factors [16]. As far as the evaluation of learning effectiveness is concerned, whether the learning effectiveness is good can be determined from students' school grades, the ability to obtain professional certificates, and performance in various external examinations. Therefore, the conceptual definition of learning effectiveness in this study 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 the measurement for learning effectiveness. Its operational definition is described as follows:

A. School grades: refers to the test scores after studying in the school and having gone through the school learning process.
B. Number of professional certificates: 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: 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 interests, enhancing the students' learning effectiveness in the preparation before teaching, in the process of teaching and in student assessment [17]. In short, teaching innovation means teachers having creativity and showing vivid and lively teaching methods to make students interested in learning, thus enhancing the teaching effectiveness. The purpose of teaching innovation for students involves: 1) developing student capabilities for independent analysis, thinking and judgment; 2) stimulating student interest and motivation for learning; 3) tapping student potential in creativity and problem-solving; and 4) enhancing students' learning ability. The purpose of teaching innovation for teachers involve: 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 [5][18][19]. From the above, the following hypothesis can be obtained:

H 1: Teaching innovation has a significant, positive, direct effect on students' learning effectiveness.

Teaching Innovation, Learning Satisfaction and Learning Effectiveness

No matter whether considering the spirit of teaching, course design, teaching methods, teaching materials and student assessment, today's teachers all need to be creative and to combine the application of information technology to innovative teaching methods and strategies. Therefore, teachers should understand about integrating information technology into teaching [20]. Integrating information technology into teaching requires the merging of information technology with course objectives, teaching materials and teaching activities, thereby enabling information technology to become an indispensable teaching or learning tool. It makes information technology become part of the teaching activity in classrooms. In addition, information technology developments provide a mean or a process that can find the solution to a problem at any time, any place [21]. Wang indicated that integrating information technology into teaching

can make learning more diversified and individualised [22]. It enhances learning effectiveness. Furthermore, He indicated that integrating information technology into teaching is a lively and creative way of teaching [23].

Jones and Paolucci believed that technology can enhance students' motivation in learning and achievement [24]. According to the study of Hoffman, integrating information technology into teaching is the best choice for teachers to improve teaching methodology and teaching skills [25]. It can also help teachers in problem-solving and innovative teaching. Implementing the integration of information technology into teaching is not an easy task, and it requires many co-operative conditions to be met. As a result, certain problems might be encountered when implementing the integration of information technology into teaching. These include man-made problems, environmental issues, funding issues, timing issues, course issues and integration issues [26]. If these problems can be overcome, there will be a positive impact on teaching innovation and learning satisfaction.

In addition, the study of learning satisfaction by most scholars includes the four dimensions of course materials, teaching, the learning environment and interpersonal relationships [27]. In distance teaching, Biner studied student learning satisfaction from television broadcasting courses [28]. The dimensions of their study of learning satisfaction included teachers, technology, process management, the location of all personnel, the agility of information delivery, support facilities and contact among teachers, etc. That study used questionnaires about *learning achievement and learning satisfaction and self-evaluation of performance* to measure online learning effectiveness.

Learning satisfaction refers to the learners' focus on various factors in the learning environment, while conducting evaluation of personal feelings and experience after learning. Positive self-assessment of performance means that learners have the confidence and the ability to acquire knowledge to demonstrate explicit behaviours [15]. While Yen and He believed the application of information technology to teaching can improve student learning effectiveness, the main issue is still the course content and the teaching activities [29]. Information technology is only one of the supporting tools. According to the above reasoning, the following hypothesis can be obtained:

H2: Teaching innovation has a significant positive effect on learning satisfaction, and students' learning satisfaction also has a significant positive effect on learning effectiveness. In other words, when Hypothesis 1 (H1) is valid, learning satisfaction has a partial mediating effect.

Based on the above research purpose and literature review, the research framework can be obtained as shown in Figure 1.
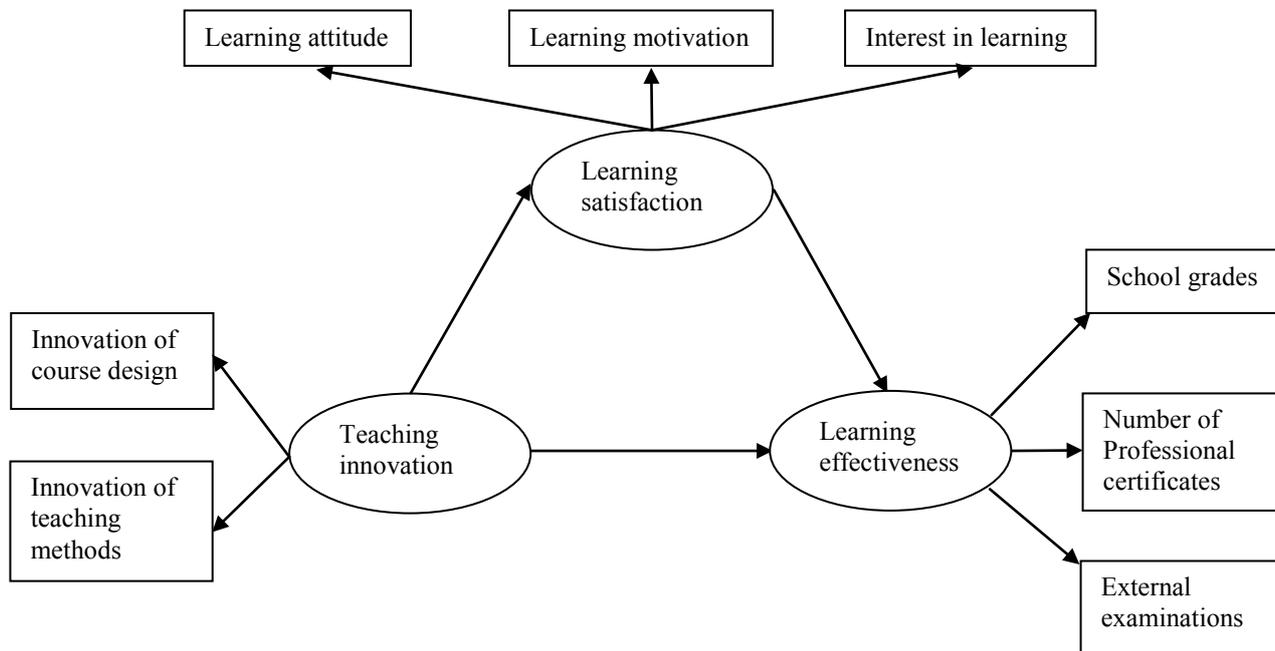

Figure 1: The research framework.

RESEARCH METHODOLOGY

Sampling Methods

This study used convenience sampling to target teachers (lecturers or above) and students in a vocational and technical college in Taiwan to conduct the questionnaire survey. This study handed out 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. Two hundred sets of questionnaires were formally handed out. There were 175 valid samples and, thus, the sample recovery rate was 87.5%.

Questionnaire Design

The questionnaire design for the study included each observable dimension. The breakdown measurement method was applied. A Likert seven-point scale method was adopted for the measurement of the questionnaire. A seven (7) to one (1) score was given according to the extent of agreement and disagreement. Seven points indicates *extremely agreed*. One point indicates *extremely disagreed*. The higher the score, the higher the degree of agreement and vice versa.

The questionnaire design of teaching innovation combined and improved on the studies by [21][30-32]; and there were two latent variables: innovation of course design and innovation of teaching methods. The questionnaire was designed according to breakdown measurements. There were four questions for each variable, a total of eight questions.

The questionnaire of learning satisfaction by Starr and Biner was adopted and improved for the questionnaire design for this study [9][33]. There were three variables: learning attitude, attitude motivation and interest in learning. There were four questions for each of the former two variables; six questions for the last variable for a total of 14 questions.

The questionnaire design of learning effectiveness combined and was improved upon from the studies [2][3]. Thus, there were three variables in the latent variable: school grades, number of professional certificates and external examinations, etc. The questionnaire was designed according to itemised measurements. There were four questions for each variable for a total of 12 questions.

Questionnaire Data and Measurement System

In order to verify the research framework proposed by this study, structural equation modelling (SEM) was adopted to conduct the confirmatory factor analysis (CFA) for the research framework. This study separated the questionnaire into three latent variables: teaching innovation, learning satisfaction and learning effectiveness. Each latent variable was separated into the observable/explicit variables (Table 1).

There were a few questions for each observable/explicit variable in the survey. The data collected from the investigation were then processed, and the original questionnaire data files were established. As for the establishment of the measurement system for this research framework, even though the questionnaire design followed the method of breakdown measurement taking into account the easier processing by computer software, the two measurements method was utilised to conduct the measurement [34]. Table 1 shows the number of questions in the questionnaire and reference sources for the implicit and explicit variables of this study.

Table 1: The number of questions of implicit variables and explicit variables in the questionnaire.

Implicit variables	Explicit variables	Number of questions	Questionnaire references
Teaching innovation	Innovation of teaching methods	4	[21][30-32]
	Innovation of course design	4	
Learning satisfaction	Learning attitude	4	[9][33]
	Learning motivation	4	
	Interest in learning	6	
Learning effectiveness	School grades	4	[2][3]
	Number of professional certificates	4	
	External examinations	4	

RESULTS AND ANALYSIS

Analysis of Linear Structural Model

Confirmatory factor analysis (CFA) is a methodology relative to exploratory factor analysis (EFA). This study conducted confirmatory factor analysis (CFA) on the three implicit variables (latent variables): teaching innovation, learning satisfaction and learning effectiveness.

The structural equation modelling (SEM) includes a structural model and a measurement model. It can effectively solve the cause and effect relationship between implicit variables. In addition, the model confirmed by this study includes three parts: 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 model [35].

Analysing the Goodness-of-Fit of the Measurement System

The factor loading of each latent/implicit variable and manifest/explicit variable 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, the more the explicit variables were able to measure the implicit variables. The factor loading of each explicit variable of this study was between 0.7 and 0.8. 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) was 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, 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 [36]. The AVE of this study were all greater than 0.5. This indicated that the explicit variables have very high reliability and convergent validity (Table 2 and Figure 2).

Table 2: Judgment indicators of the measurement system within the model.

Latent variable (Implicit variable)	Manifest variable (explicit variable)	Factor loading	Variance extracted, VE
Teaching innovation (X)	X1	0.72	0.53
	X2	0.75	0.57
Learning satisfaction (ME)	$\varepsilon 1$	0.74	0.56
	$\varepsilon 2$	0.76	0.58
Learning effectiveness (Y)	Y1	0.77	0.58
	Y2	0.78	0.59

Analysing the Goodness-of-fit of the Structural Model

Path Analysis Results of the Structural Model

After the confirmation of the goodness-of-fit of the model, the following results are listed in Table 3: Parameter estimate of each implicit variable, standard error (SE) among implicit variables and critical ratio (CR).

Table 3: Path analysis results of the structural model.

Path coefficient between implicit variables			Estimate	SE	CR	P	Label
Teaching innovation (X)	→	Learning effectiveness (Y)	0.541	0.031	17.451	**	c
Teaching innovation (X)	→	Learning satisfaction (ME)	0.432	0.021	20.571	**	a1
Learning satisfaction (ME)	→	Learning effectiveness (Y)	0.243	0.022	1.105		b1

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) shown in Table 4, is the degree of explanation of each independent implicit variable with respect to each dependent implicit variable.

Table 4: Path coefficient of determination.

Coefficients of determination	R^2
Teaching innovation→Learning effectiveness	0.73
Teaching innovation→Learning satisfaction	0.72
Learning satisfaction→Learning effectiveness	0.74

The Goodness-of-fit Analysis of the Overall Model

The linear structural equation modelling (SEM) was applied to accomplish the purpose of model building for this study, to examine the relation among the latent variables and to test whether the measurement system has the measurement reliability. The overall goodness-of-fit was measured for this study.

The overall goodness-of-fit indicators used to measure this study were χ^2, df, GFI, AGFI, NFI, CFI, RMR, RMSEA. Generally, the following relations should hold: χ^2/df <5; 1>GFI>0.9; 1>NFI>0.9; 1>CFI>0.9; RMR<0.05;

RMSEA<0.05 [37]. The goodness-of-fit for the overall model of this study was χ^2/df <5. GFI, AGFI and NFI were all greater than 0.90, and the RMR value was smaller than 0.05. It showed that the goodness-of-fit of the overall model was good, as indicated in Table 5.

Table 5: Evaluation table of the overall model fit.

Determination index	χ^2	df	GFI	NFI	AGFI	CFI	RMR	RMSEA
Fit value	5.970	6	0.902	0.934	0.906	0.931	0.023	0.035

Standardised Results of the Linear Structural Equation Modelling, SEM

The entire framework of the standardised results after computer execution is shown in Figure 2.
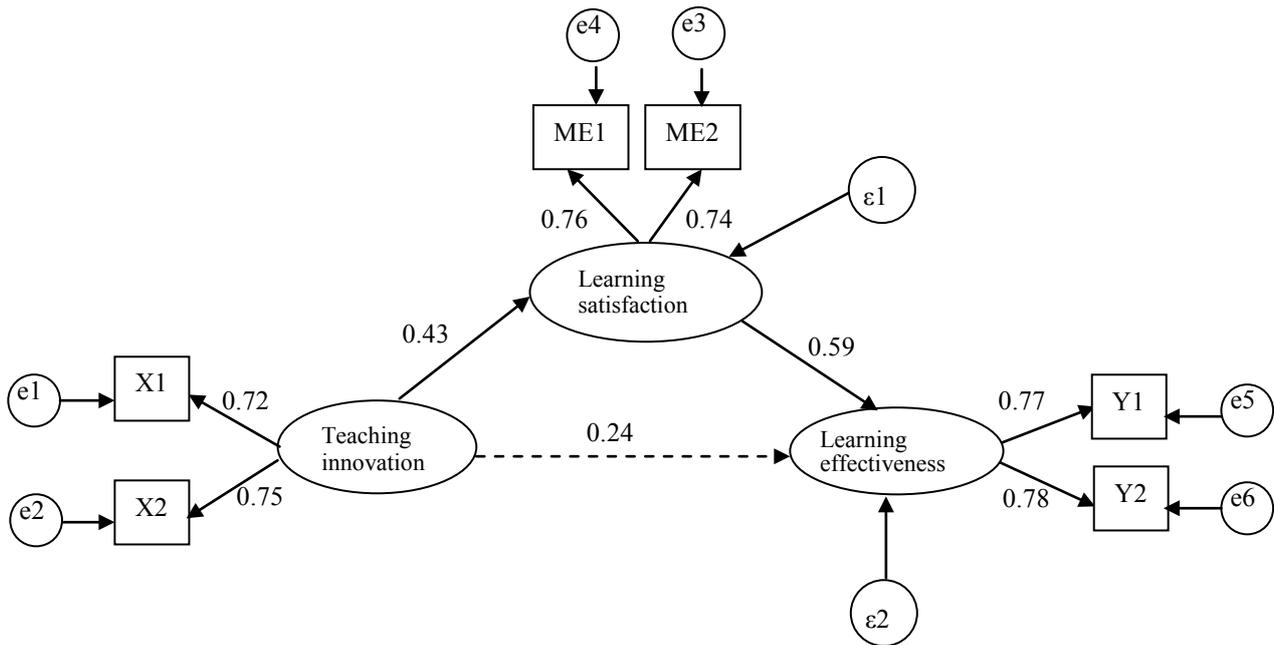

Figure 2: Standardised results of SEM analysis.

The verification of the Path Effect Analysis of the Structural Model

Aiming at the path coefficient between each implicit variable (also called a latent variable) of the structural model, this study used Bayesian estimation to conduct the verification of the path effect analysis with the learning satisfaction (ME) as the mediating factor as shown in Table 6.

1. The path coefficient of teaching innovation (X) with respect to learning satisfaction (ME) was a1 = 2.695, 95% confidence interval (0.946, 2.336), significant, significant first order effect.
2. The path coefficient of learning satisfaction (ME) with respect to learning effectiveness (Y) was b1 = 4.033, 95% confidence interval (3.520, 4.324), significant, significant second-order effect.
3. The path coefficient of teaching innovation (X) with respect to learning effectiveness (Y) was c = 3.670, 95% confidence interval (3.530, 4.524), insignificant, third-order effect was insignificant (but had a positive effect).

Table 6: Bayesian estimation.

Regression weights	Mean	SD	95% Lower bound	95% Upper bound	Name
Teaching innovation(X)→ Learning satisfaction(ME)	2.695	0.378	0.946	2.336	a1
Learning satisfaction(ME)→ Learning effectiveness(Y)	4.033	0.264	3.520	4.324	b1
Teaching innovation(X)→ Learning effectiveness(Y)	3.670	1.045	-3.530	4.524	c

Table 7: Custom estimates.

Numeric estimates	Mean	SD	95% Lower bound	95% Upper bound
Direct effect, a1	2.695	0.378	0.946	2.336
Direct effect, b1	4.033	0.264	3.520	4.324
Direct effect, c	3.670	1.045	-3.530	4.524
Indirect effect (a1*b1)	10.869	1.683	3.783	9.844
Total effect (c+a1*b1)	14.539	1.997	6.167	14.128
Ratio of indirect effect over total effect	0.748	0.127	0.681	1.243

Table 7 shows that:

1. Indirect effect a1*b1 was estimated to be 10.869, 95% confidence interval (3.783, 9.844), significant, the indirect effect was significant. The ratio of indirect effect over the total effect was estimated to be 74.8%.
2. Because the indirect effect was significant, the direct effect has a positive but insignificant impact. Therefore, learning satisfaction has a completely mediating effect of teaching innovation on learning effectiveness.

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

1. Teaching innovation has a positive, direct but insignificant effect on learning effectiveness. The standardised path coefficient was 0.24. Thus, Hypothesis H1 obtained partial support. (The hypothesis is partially valid).
2. Teaching innovation has a significant positive effect on learning satisfaction, and learning satisfaction has a significant positive effect on learning effectiveness. In other words, under the circumstance of Hypothesis 1 (H1) being partially valid, learning satisfaction has a complete mediating effect. (The hypothesis is partially valid).

CONCLUSIONS AND SUGGESTIONS

Conclusions

Through the analysis of the above results, the following conclusions have been obtained:

A. 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 study. It showed there was a good fit for this model.
B. In terms of practice verification:

- In terms of the relational dimension of teaching innovation and learning effectiveness, teaching innovation in Taiwan's vocational and technical schools/colleges will have a positive effect on learning effectiveness, but it will be insignificant. This conclusion was partially the same as the research results of Chang and Wang [19].
- In terms of the relational dimension of teaching innovation and learning satisfaction, teaching innovation has a significant, positive, and direct effect on learning satisfaction in Taiwan's vocational and technical schools/colleges. This conclusion is consistent with the research results of Wang [22], and Jones and Paolucci [24].
- In terms of the relational dimension of learning satisfaction and learning effectiveness, learning satisfaction has a significant, positive, and direct effect on learning effectiveness in Taiwan's vocational and technical schools/colleges. This conclusion is consistent with the studies by Yen and He that demonstrated learning satisfaction affects learning effectiveness [29]. In summary, teaching innovation has an insignificant effect on learning effectiveness, and learning satisfaction has a complete mediating effect.

Contribution of the Study

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. Instead, it was necessary to use confirmatory factor analysis and structural equation modelling respectively as a measurement approach and model framework in this study. Therefore, this study has used quite innovative research methods.

As for practical interest: Scholars were inclined to stress exploratory factor analysis in their past studies. However, this study combines prior relevant research results from those scholars and sets up its modelling 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 worthy of further research in the related fields of studies in the future. Besides, the results can be used for the school administration to set up strategies for organisational change; therefore, this study serves as a most valuable reference.

Suggestions

The purpose of teaching innovation is to enhance students' knowledge and wisdom. That is, it is meant to create knowledge to cultivate a flexible and intelligent high-quality learning process. Therefore, innovation provides valuable knowledge for school students to accumulate knowledge, to be the source for students to enhance learning quality of learning and learning motivation. From the above research results, it is acknowledged that teaching must meet the needs of social development, bring modern cloud technology into action, use online teaching or electronic whiteboards to solve teaching problems, and be able to bring teachers' creativity into play, to elevate the students' learning satisfaction, so that the students' learning effectiveness can be enhanced. Therefore, the following methods have been proposed as a recommendation to instructors in the construction of innovative teaching programmes:

1. Innovative teaching concepts are the prerequisites for teaching innovation in schools. Concept is the precursor to action. This requires educators to renew their concepts, and create new models to meet the requirements. The innovation of a teaching model occurs only after the innovation of the teaching concept.
2. The innovation of teaching capability is the key to teaching innovation in schools. The teaching content continues to change according to the changes in modern developments. Educators must continue to enrich and to enhance their teaching ability, so that they can constantly adapt to the requirements raised by changing educational developments, thereby satisfying the needs of the clients of teaching.
3. Good professional ethics of teachers is the force for teaching innovation in schools. Teachers' professional ethics directly affects teaching quality. A teacher should have the professional ethics to be responsible for the sources and results of the teaching quality. The internal driving force of innovation in teaching includes while teaching, more respect for the students, more effort and energy given to the class, and more consideration of the problems.
4. Teachers' good professional quality is the basis for teaching innovation in schools. In the teaching process, teachers should carefully study and fully explore the rich content of teaching materials: highlighting the characteristics of teaching, while emphasising both theory and practice. They should cultivate the learners' ability to apply consciously learned theories to solve problems, improve teaching methods, enhance teaching capacity and elevate teaching standards.
5. Teachers' innovation of teaching methods is the ultimate goal of teaching innovation in schools. Teacher counselling is an important way for students to receive teaching. To increase student interest and enhance learning effectiveness, the teaching methods must be innovative to broaden the students' thinking space as much as possible. This should merge knowledge, liveliness, fun and practicality into one.

In summary, education is a holistic approach, providing students with proper development in academic life and interpersonal experiences with an emphasis on general, all-round education. Education should cultivate students' rational reasoning, ability to express skills and develop the creative capacity of intellectual contemplation, emotional concern and the ability to give. It should also develop good moral sentiments and cultivate a temperament in the arts and humanities, so that students can not only become people with professional competence of science and technology, but can also become intellectuals with a grand vision. These are the necessary focal points when a school emphasises the construction of teaching innovation.

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