Motivation-Oriented Teaching Model for Certification Education

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Abstract

To evoke public emphasis on the professional skills training in vocational education, the Ministry of Education (MOE) in Taiwan has recently focused on the certificate of information skills. However, the lack of a systematic and institutionally certified instructor training model within Taiwan not only varies the quality of certified instructors, but also relegates the certificate education from speciality education to "automatic response training." Therefore, this study included an experienced instructor of information skill certificates, who generated outstanding teaching outcomes using her distinctive education philosophy. We use the three domains: cognitive, affective, and psychomotor to evaluate the instructor's performance. The results indicate that five critical elements existed in the training model: 1. incite learning motivation; 2. establish information skills; 3. cultivate professional knowledge; 4. develop student potential; and 5. use teaching resources broadly. Several pedagogical implications can be drawn from this study. One of the contributions of this study is the development of a coding scheme that specifically focuses on the teaching strategies given by an experienced instructor of information skill certificates, thereby extending the understanding of certification education. As such, this study may also serve as an impetus for further investigations that might apply this model in diverse educational settings.

Keywords: certificate, teaching/learning strategies, improving classroom teaching, pedagogical issues

1. Introduction

In response to the demands of international talent cultivation, Taiwan classified "information technology education" as a key focus and policy for future development in a 2012 educational policy white paper. In 2009, the Taiwanese Ministry of Education listed international certification, information technology certification, and professional certification as evaluative indicators for higher education, contributing to the demands for professions such as "computer instructor," "information technology application instructor," and "information technology certification instructor." However, few information technology instructors employed in Taiwanese industry have received formal pedagogical training. Furthermore, the majority only emphasize intuitive operation reflection training in the educational process. Whereas industry businesses are able to manage certification pass rates successfully under this educational system, learner application and innovation abilities are largely denied.

Because few previous studies regarding certification have examined "educational strategy", this study conducted in-depth research regarding "the content of information technology certification education." Additionally, we applied the classification of teaching objectives which are in three domains, cognitive, affective, and psychomotor, to identify how many extents of the efforts made by the instructor in her teaching strategies in the three domains.

To produce more rigorous results, the researchers of this study used the industry expert standards from the "Ministry of Education Collaborative Teaching Plan to Subsidy Technical Universities and Colleges in Employing Industry Members" as criteria when searching for case study subjects. This study then invited expert

information technology certification instructors well-known in industry circles who possessed 15 years of teaching experience in information technology education to participate in the study (case-study certified lecturers) and examined the teaching content of expert information technology certification instructors. This study was conducted to provide reference data for university and college and high school and vocational high school certification teaching strategies. Furthermore, this study hopes to contribute to the evaluation standards for expert instructor education. Thus, the objectives of this study are as follows:

1) Explore "the teaching strategies of expert information technology certification instructors."

2) Propose "motivation-oriented certification teaching models."

2. Literature Review

2.1 Teaching Strategies

Teaching strategies refer to the "overall direction and objectives of teaching events that must be planned and designed through complete educational processes, as well as using multiple teaching methods based on the factors influencing education and effectively achieving education goals." Dramatic developments in teaching strategies have markedly impacted achievements of teaching and learning. Particularly, certification teaching and learning is attracting more and more attention in higher education nowadays and few researchers have investigated the teaching strategies of certification education. In response to the rapid increase in the number of certification courses and addressing this gap, this study is based mainly on the four teaching strategies introduced as follows: practice teaching method, developmental method, mastery learning, and presentation teaching method.

First, the practice teaching method was proposed by educational psychologist Edward Thorndike (Galef, 1998). This teaching method emphasizes the strengthening of memory, mastery of actions, and cultivation of good habits. Specific teaching procedures include inciting motivation, demonstration, imitation, repeated practice, and evaluation. The recent studies indicated that the practice teaching method is an effective method that meets the growing needs of diversified instructions (Rosa, 2007; Sundberg et. al., 2011; Lei, 2012). Oluwatayo and Adebule indicated that "The teaching practice is one of the most important aspects of teacher education" (Oluwatayo & Adebule, 2012). In their work, the teaching practice is considered to be an important education subject which has to be monitored thoroughly in teaching/learning process. Furthermore, according to learners' needs, the practice teaching is useful to develop their innovation ability (Li & Ding, 2010).

Second, the developmental method was proposed by German education scholar J. F. Hewett (Herbart, 1965), who opposed the simple implantation of knowledge and instead emphasized the proactive thinking of learners, the teaching of problem solving skills, and that learners should gain analytical, inductive, and analogical skills (Krathwohl, Bloom & Masia, 1964). Rein, who later improved Herbart's teaching method, classified this method into a five step teaching methodology as follows: preparation, presentation, comparison, generalization, and application categories to facilitate using developmental methods in the classroom.

Mastery learning is often applied in themed educational activities to minimize achievement gaps (Zimmerman & Dibenedetto, 2008); certification education activities are educational activities of this type. Mastery learning can assist learners of various degrees of proficiency to reach anticipated degrees of mastery within a short amount of time (Galef, 1998). Henry Morrison proposed mastery steps including: exploration, presentation, assimilation, organization, and recitation (Simpson, 1972). This study uses mastery learning steps to evaluate teaching strategies conducted in certification teaching.

Finally, presentation teaching, which emphasizes inciting motivation, data collection, selection of presentation methods, and evaluation, is used to cultivate learner presentation skills, perceptive ability, and creative ability.

2.2 Classification of Teaching Objectives

To examine educational objectives more accurately, Bloom, Englhart, Furst, Hill, and Krathwohl (Li & Ding, 2012) categorized educational objectives into the cognitive domain, affective domain, and psychomotor objectives. Regarding the cognitive domain, it is of the utmost concern to many educators. The six levels of Bloom's cognitive category occur in increasing complexity including knowledge, understanding, application, analysis, evaluation, and synthesis. Anderson et al. (2001) further adjusted Bloom's taxonomy and replaced 'synthesis' level with 'creation'. Huang (2011) applied the six levels into blog-based teaching/learning for developing learners' cognitive abilities. The result implies that the well-designed learning activities indeed help students retain their cognitive abilities proposed by Bloom. In this study, the modified taxonomy would be used to evaluate the experienced instructor's teaching on cognitive performance.

The affective domain refers to the process of a learner receiving or attending, responding, valuing, organizing, and performing final characterization according to a value or value system when faced with a value (Galef, 1998). Affective learning goals have been identified as essential components of holistic or integrative education by UNESCO (2006). In the studies of teacher education, affective variables have been usually emphasized as indispensable teaching elements by inservice teachers (Weinstein, 1989; Ritter, 2011). Bloom and his colleagues identified affective learning in a hierarchy (Galef, 1998), which includes five stages: (1) an ability to listen (to receive), (2) to respond in interactions with others, (3) to consider attitudes or values appropriate to particular situations (to value), (4) to organize values so as to demonstrate balance and consideration, and (5) at the highest level, to display a commitment to principled practice on a day-to-day basis (to internalize or characterize) (Galef, 1998; Buissink-Smith, Mann, Shephard, 2011). In past studies, these five stages have also been applied with the cognitive domain for developing a cognitive/affective teaching framework (Huang, 2012). In this study, we use these five stages to evaluate whether the experienced instructor applied affective teaching in her instruction.

Finally, the psychomotor domain refers to the formation, development, and display of motor abilities or skills controlled or guided by human psychology. Simpson published a psychomotor domain educational objective classification method in 1972 including various concrete, visible actions and behaviors; the objectives can be further divided into seven levels: perception, set, guided responses, mechanism practice, complex response, adaptation, and origination (San Diego Figure Skating Communications). Similarly, we use these seven levels to evaluate the achievement of the experienced instructor's teaching on the psychomotor performance.

3. Research Method

This study used grounded theory to analyze and code the qualitative data and outline the content of information technology certification education strategies and to further propose an "information technology certification education model."

3.1 Teaching Method Coding

To effectively analyze the content taught by expert information technology certification instructors, this study used the previously mentioned teaching methods and grounding theory to code the methods (from A-1 to D-4). Furthermore, information that could not be classified during the analysis process, but retained a degree of importance (and could not be ignored), was coded E1. The content of the teaching strategy coding is shown in Table 1.

Table 1. Teaching method content explanation

Teaching Method	Code	Name	Explanation
Practice Teaching Method	A1	Instilling Motivation	Explanation of key learning points and objectives to instill learner motivation.
	A2	Demonstration and Explanation	The teacher explains procedures and tricks
	A3	Independent Imitation	Independent imitation by the learner, with the teacher observing and correcting mistakes.
	A4	Repeated Practice	Repeated practice allowing learners to gain mastery rapidly.
	A5	Evaluation of results	Evaluation of teaching results and whether the knowledge and skills have been mastered.
Developmental Method	B1	Preparation of Motivation	Understanding learner qualities and levels of proficiency, deciding the teaching materials to use, and designing activities to instill motivation.
	B2	Presentation of Main Points	Explaining and describing the main points of the material in a concise, precise, and orderly manner.
	B3	Comparison and Association	Stimulating learners to discover principles or causes through interaction.
	B4	Conceptual/	Assisting the categorization and

		Generalized Knowledge	differentiation of learner ideas to facilitate systematic and integrated absorption of the material.
	B5	Application and Verification	Instructing learners to apply the learned concepts or knowledge practically and to verify them through problem solving.
Mastery Learning	C1	Pre-testing	Understanding the entry behaviors and old experiences possessed by the learners relevant to the educational content.
	C2	Presentation of Teaching Materials	Provide suitable presentation of the teaching materials after the pre-test stage.
	C3	Assimilation and Collection	The learners already completely understand the educational content and undertake independent research or reading activities.
	C4	Knowledge Organization	The primary objective is to analyze and categorize the collected knowledge and organize it into various categories.
	C5	Recitation Report	The learners perform inductive analysis of their self-studied results and provide a short report.
Published Teaching	D1	Instilling Motivation	Instilling in learners the motivation to present.
	D2	Data Collection	Instructing learners to collect, practice, or create presentation content.
	D3	Presentation Method	Instructing learners in presentation skills and methods
	D4	Evaluation	The teacher and students jointly evaluate the final results.
Other	E1	Important but unclassifiable information	

3.2 Data Collection and Coding

This study was conducted between August 2011 and May 2012. During this period, researchers collected data by using methods such as video recording, audio recording, and recording text. The video recordings were conducted according to unstructured and non-involvement principles. Afterward, an observation journal was written in detail and reliably based on the content of the video to obtain first-hand information for analysis. As shown in Table 2, each sentence in the transcripts might be coded into one or more teaching strategies shown in Table 1. Afterward, we evaluated whether the teaching content are in accordance with three categorized educational objectives (e.g., cognitive, affective, and psychomotor objectives). Eventually, we expect to construct a teaching strategy model for certification and information engineering education. The following table contains a portion of the coding analysis results of this study. Here, S refers to the students, whereas N represents the name of the teacher.

Table 2. A portion of the coding analysis results

Teaching Process	Teaching Activity Record and Teaching Method Coding Analysis	Coding Statistics (Code/Frequency)
1-Opening Lecture (30 Minutes)	I am today's instructor, *N* [E1]. Before we begin class today, I have something to discuss with everyone[E1]. I have some habitual motions, [E1] and don't bother to sit at the instructor's computer during class [E1]. Sitting in a corner seems really anti-social to me (*S* smile) [E1], just another person mumbling at the computer screen (*S* smile) [E1] with no one knowing what the teacher looks like after class [E1]. So, I rarely sit there during class time [E1]...I just asked the class representative and found out that our class has seven class officers [B1]. The student numbers are numbered from 1-37 [B1]. As to why it's the 28th, it's because the 28th is my birthday [E1]. September. My birthday is September 28th (causing *S* to discuss September 28th) [E1]. That's right, Teacher's Day [E1]. When I wrote essays as a child my dream was to become a teacher [E1], but my grades were bad [E1]. My teachers told me, it can't be possible for you to become a teacher with these grades [E1]. I was so sad then, but fortunately I got the opportunity to become an instructor after I grew up (*S* listen to the lecture while smiling) [E1].	A1/66 B1/80 C1/12 D1/14 D3/7 E1/78

Let us take a short survey. Those of you who haven't used POWERPOINT before, raise your hand (some *S* raise their hands) [A1 B1 C1]? If you haven't used any Office series before, raise your hand (*S* actively discuss the use of the 2003, 2007, and 2010 versions) [A1 B1 C1]? Click on FB(Facebook)[E1], go into information[E1]. My name is … [E1], and I have been engaged in information technology education for more than 15 years now[E1]...after 15 years of accumulation (*S* are absorbed in concentration) [E1], because I have more than 50 certifications [A1 B1 E1]…each certification represents a certain information technology skill (*S* are absorbed in concentration). In other words, no matter how many times you take a test for WRD, it counts for a certification [A1 B1 E1]. I have 50 certifications, meaning that I have 50 abilities [A1 B1], 50 different skills in information technology [A1 B1 E1]. I can do jobs such as that of an administrative assistant, webpage designer, program designer, film editor, photography editor…(*S* are absorbed in concentration) [A1 B1 E1]. While I choose to be a lecturer right now, when I decide to switch jobs, I believe that with these technical skills [A1 B1], I won't starve [E1].

So, you have to look at the abilities behind certifications [A1 B1]. What I want to share here with everyone is that: "I hope that if you have the ability, you'll be able to get certified" (*N* talks to the *S* in an affirmative voice and looks at them in an affirmative manner) [A1 B1 E1]. Finally, there's a phrase I'd like to share with everyone: "What's awesome isn't the software itself, but the commercial value that it creates!"[A1 B1 E1] If you can use POWERPOINT to create commercial value, and then the world is yours to conquer [A1 B1 E1].

This individual, who obtained 29 certifications by the third year of middle school [E1], is currently a second year high school student studying information technology at National Taichung Industrial High School.

4. Qualitative Results

To examine the proposed motivation-oriented certification teaching model, an in-depth case study was conducted to explore teaching process and content of the case instructor. Video recording, audio recording, and subsequent interviews were used to obtain first-hand information, then, the practice teaching method, developmental method, mastery learning, and published teaching procedures applied to the data for coding and analysis. The qualitative results are categorized into the following two points.

1) The integrated methods and research process of constructing an educational-theory-based teaching model.

2) The motivation-oriented teaching model and standards which is capable of energizing information technology certification teaching.

4.1 Expert Information Technology Instructor Certification Teaching Strategies

This study used the procedures of opening lecture, course introduction, demonstration of mock question solutions, mock question solution, and general review to analyze teaching in parts. Here, the analysis results of opening speech teaching content emphasize the significantly different teaching content of this procedure when compared to the other four. The lecturer implemented large amounts of educational activities that induce motivation. Before entering the formal curriculum, the instructor used a conversational tone to understand the class and its members, as well as their pre-existing knowledge. The instructor explained the value of obtaining certification and the importance of cultivating ability, developed a learning role model and explained the characteristics of the certification test, and continually incited learner motivation to learn in the classroom. Of particular note is the high number of E1 (other category) codes during this procedure. Later analysis revealed that this content, which was not directly related to the class or certification curriculum, produced a harmonious and friendly learning atmosphere, thus pulling together the unfamiliar lecturer and students. This content creates the effects of social support. The instructor used unofficial methods to slowly disclose his/her identity and experiences to gain the trust of the students. Based on the above, this lecturer placed the teaching emphasis on inducing motivation during the opening speech procedure, with mutual familiarity, trust building, and value presentation as the primary content.

In subsequent teaching procedures, the content of "course introduction" emphasized cultivating professional knowledge and the ability of learners to memorize and understand factual and conceptual knowledge related to certification, such as: what type of software PowerPoint is and what line spacing is. Thus, educational strategies emphasized demonstration and explanation and the presentation of materials.

In "demonstration of mock problem solutions," emphasis was placed on cultivating students to be exposed to and memorize procedural knowledge, such as: how to add more slides and how to change line spacing. Second, demonstration teaching was used to guide students in "applying" various concepts and factual knowledge to explore and "analyze" questions or topics. Here, instructors can use comparison and associations and conceptualized/generalized knowledge strategies to benefit their teaching.

Then, the "mock question solution" stage used strategies such as independent imitation, presentation methods, repeated practice, and results evaluation to demand that students be able to apply their knowledge and analyze questions and topics independently. Performing drills of learned procedural knowledge, independent imitation, and repeated practice of problem solving assists students in mastering procedural knowledge. The practice of multiple problem types allows for the cultivation of comprehensive abilities.

Finally, in the final "general review," strategies such as knowledge organization, recitation reports, evaluations, and application verification were applied to cultivate student evaluation skills and strengthen meta-cognitive knowledge.

4.2 Motivation-Oriented Certification Teaching Model

We conducted in-depth interviews on the expert information technology certification instructor "teaching content" and "teaching strategy" derived through case-study analysis; the final obtained "information technology certification teaching model" is shown below (Table 3).

Table 3. The proposed motivation-oriented certification teaching model

Information Technology Certification Teaching Model	
Teaching Objectives: (1) formation of technical skills (2) structuring professional domain knowledge (3) stimulating potential abilities	
Sequential Teaching Methods	Explanation of Content
(1) Triggering Motivation and Obtaining Approval	Triggering learning motivation by obtaining learner approval, trust, and adoration. Approving of the educational model and subsequent active participation in learning activities.
(2) Cultivating Professional Knowledge	Establishing fundamental technical skills in learners while communicating relevant professional knowledge to facilitate learner understanding of the reasons behind these skills and knowledge.
(3) Sharing Evaluation Results Through Group Activities	Sharing the results of self-study through independent and group interactions and ensuring mastery of knowledge and skills through verification presentations, and using recitation activities to evaluate learning results.
(4) Repeating Practice to Rapidly Gain Mastery	Effectively assisting learners in completely absorbing the teaching materials and repeating practice until rapid achievement of mastery.
(5) Extended Learning	Extending the desire for proactive learning, creating learner motivation to participate in subsequent activities.

By the proposed model, we can afterward develop architecture of teaching plans as shown in the following figure. The novice instructors could follow the model and architecture for designing their own teaching plans for different course subjects. Note 1 shows a practical teaching plan architecture for the subject MOS PowerPoint in Chinese version.
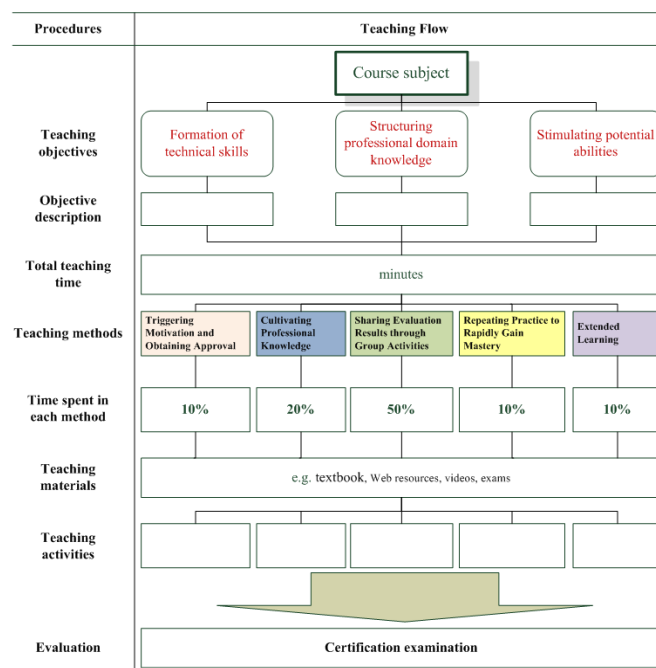

Figure 1. Teaching plan with the proposed teaching model for certification education

5. Quantitative Results

5.1 Certification Pass Rate

The quantitative outcomes are presented through the successful certification pass rate. The certification pass rate is a fundamental and objective quantitative indicator to evaluate instructors' teaching performances. In this case

study, the results were shown in terms of MOS PowerPoint Certification. In according to the statement of Microsoft Corporation, candidates who pass a certification exam show that they can meet globally recognized performance standards. The full marks is 1000, and 700 is the passing score. Analysis of the performance of students who attended the class of the case instructor indicate that the students' pass rate reached 99%, with 90% obtaining exceptional scores higher than 900 points. Thus, based on an objective certification pass rate, the case teacher's teaching is able to achieve superior certification results.

5.2 The Statistics of Teaching Performance on Cognitive, Affective, and Psychomotor Domains

After extracting the explanation of the expert's teaching content, we analyze, integrate, and present in the 'Teaching method content explanation' shown in Table 1. We then analyzed each sentence of the observation journal. The results showed the proportions comprised by the three educational objectives (i.e., cognitive, affective, and psychomotor) and connotations; these findings were used by the case teacher. Subsequently, we evaluated whether the case teacher's teaching process achieved the three educational objectives (Table 1). Regarding the cognitive objective, the results showed that the case teacher's certification teaching strategies commonly employed memory as the teaching objective (13%). However, differed from that of general certification teaching, in this strategy, the case teacher focuses on developing students' ability to understand (10%) and the evaluations of self-learning results (6%). Regarding the affective domain, the case teacher commonly employed the teaching strategy to guide students to produce responses (9%). This method of student interaction during classes created by the case teacher effectively guides students to respond.

Based on their skills, the case teacher strongly emphasized the set level (17%). Since the subdivision of Psychomotor is closely related with the "Responding to phenomena" subdivision of the Affective domain, the results are line with the above results in affective domain.

Table 1. The statistics of teaching performance on cognitive, affective, and psychomotor domains

Three educational domains	The process dimension in three domains	The statistics of teaching performance		
The Revised Bloom's Taxonomy in cognitive domain	Remembering	979	13%	
	Understanding	695	10%	
	Applying	181	2%	37%
	Analyzing	144	2%	
	Evaluating	449	6%	
	Creating	174	2%	
Krathwohl's Taxonomy in affective domain	Receiving	199	3%	
	Responding	675	9%	
	Valuing	345	5%	27%
	Organization	358	5%	
	Characterization	68	1%	
Simpson's Taxonomy in psychomotor domain	Perception	402	6%	
	Set	1225	17%	
	Guided Response	570	8%	
	Mechanism	204	3%	36%
	Complex Overt Response	248	3%	
	Adaptation	174	2%	
	Origination	201	3%	

5.3 The Effectiveness of the Motivation-oriented Certification Teaching Model (MOCTM)

To verify the teaching effectiveness of MOCTM, we conducted three experiments, using MOS PowerPoint certification as the experimental class. The experiment participants were 3 certification teachers (Instructors A, B, and C) who had not applied the MOCTM model. One week before learning about MOCTM, each certification teacher was instructed to teach the control class. The case teacher of this study then trained the 3 experimental teachers to use the MOCTM model. The duration of this training course was 2 weeks. During training, the expert instructor completed a "table for lesson designing" and "diagram of lesson frameworks" with the experimental teachers. After completing the training, the experimental teachers applied the MOCTM model and taught an experimental class with similar characteristics as the control class. This experiment was conducted to evaluate teachers' teaching performance after receiving MOCTM training. The teaching results are shown in Table 2.

Table 2. Comparisons of students' results before and after the application of MOS PowerPoint information certification teaching model

Instructor		A	B	C
Seniority (years)		6	3	2
Three classes (Control group)	Total	40	42	45
	Pass	35	30	35
	Pass rate	82.50%	80%	75.00%
	Average test scores above 50%	947	947	993
	Average test scores below 50%	667	667	777
	Standard deviation	151	191	162
Three classes (Experimental group)	Total	40	44	39
	Pass	39	44	39
	Pass rate	97.50%	100%	100%
	Average test scores above 50%	979	982	1000
	Average test scores below 50%	880	877	973
	Standard deviation	81	75	49
t test		2.13*	2.09*	1.92*

*$p < .05$

The results showed that the pass rate and performance results of the experimental group were higher than those of the control group. Besides describing the statistical data, we performed a t-test to determine whether the average results of the experimental and control groups before and after MOCTM teaching differed. The t-test analysis results showed that the experimental group's results differed significantly from those of the control group. Furthermore, when taught by the same teacher, the experimental group's pass rate was higher and their standard deviation was smaller compared to that of the control group. This result indicates that when students' average test scores increased, the difference between each student's test score declined. We further analyzed the test scores by dividing the class results into those above and below 50%, and found that even the experimental group students who obtained test scores below 50% had better results than those of the control group.

6. Discussions

6.1 Case Teacher's Teaching Methods and the Cognitive, Affective, and Psychomotor Objectives

The results of this study show that besides valuing skills education, case teachers also recognize the importance of cognitive and affective teaching. This distinguishes the teaching methods of the case teachers from those of the certification teachers, who simply emphasize skill transfers. Following an open-ended interview to understand the case teacher's perceptions, we found that case teacher believed the enhancement of information skills abilities (i.e., skills education) was the most basic and easily achieved dimension of certification teaching.

Additionally, the quantitative analysis evaluation results showed that in the skills dimension, the case teacher's teaching methods also demonstrated the importance of enhancing students' perceptions, sets, and guided responses. Furthermore, the case teacher also believed that skills education must employ cognitive education as the basis of procedural knowledge and further cultivate students' cognitive abilities regarding application, analysis, integration, and creation. In other words, for students to develop valuable skills, they must learn to identify hidden meanings.

Finally, within skills and cognitive teaching, the case teachers also incorporated affective education. In contrast to skills and cognitive teaching, affective education emphasizes inspiring students regarding their internal value, learning willingness, attention, feedback ability, and life principles. From education observation, we understand that the case teacher can employ her own or others' experiences to motivate student learning. For example, to enhance students' cognitive learning, teachers must ask questions and, in a friendly manner, "invite" the students to respond to obtain their responses and perspectives and recognize their positive concepts. During the interviews, the case teacher contended that affective education was the most crucial factor influencing the development of individual ability. They further stated that certification education should also guide students to accept and construct positive values and actively solve problems; thus, the characterization of students' multiple abilities can be developed.

6.2 MOCTM Improves Pass Rate

Comparing MOCTM to conventional certification teaching methods, the most significant difference was that the MOCTM emphasizes a teaching process of motivation, flexibility, and systematization. Based on the students' previous experiences where they failed certification examinations, besides their unfamiliarity with the examination procedures, the students failed because they lacked a solid understanding of the software techniques applied in the examination. They also lacked achievement motivation and commitment; thus, they were not inspired to study diligently. Regarding the teacher attributes, through the interviews, we found that of the teachers who participated in the study experiment, MOCTM acceptance was higher among the teachers with less seniority. Furthermore, these less-senior teachers could integrate the MOCTM model with their original teaching methods, and subsequently apply the model with ease.

7. Limitations of the Study

We need to admit that much remains to be done, then, but we anticipate that the work will generate important findings in the fields of certificate education. Firstly, we have only chosen one certification examination (MS PowerPoint) as the experiment subject. In this concern, we are going to attempt to implement the proposed model on the other information certificate teaching. In the future work, we expect to explore more interesting issues about the generalization and regularization of the proposed model. Secondly, although the proposed teaching model is empirically validated by quantitative and qualitative data, validities were not examined by expert validity. Due to the time limit, we have not invited other experts on this field to validate the proposed teaching model, which may cause the bias. The third limitation of the study is that we have not investigated the factors from individual learners. In the future, we consider to investigate more factors (e.g., individual, social, and environmental factors) that may affect the effectiveness of the model. Also, we intend to continue to build a focus on the development of certificate education through our collaborative work with information certificate teacher education colleagues, student teachers and school partners.

8. Conclusion

Teaching is a disciplined, systematic approach to professional development. This study shows that the construction of teaching model for certificate education is fostered not only by theoretical basis in teaching strategies but also by educational objectives in cognitive, affective, and psychomotor domains. The research results correspond with the core values of this study in that information technology certification teaching should be more than simply "certification testing preparation." Using intricate teaching strategies with a theoretical basis can help establish a strong desire for learning and proactive learning attitudes in students during the learning process. Furthermore, team interaction and presentation activities can assist in mastering information technology skills while enriching the educational content and value.

The results of this study can be provided as a reference for Taiwanese universities and colleges as well as high schools and technical schools for IT certification education designers in teaching improvement and course design. The findings can also be provided for IT certification education organizations for use in cultivating professional instructors and their pedagogical training. The study provides a better understanding of what is required for learners to reach deep understanding, what leads to effective teaching, and the conditions that lead to supportive model for teaching and learning. Essentially, expert instructors realize the structure of the knowledge in their

disciplines. This knowledge provides them with cognitive roadmaps to guide the information they give students in cognitive domain, the strategies they use to motivate students in affective domain, and the skills they teach students in psychomotor domain. Accomplished teachers also assess their own effectiveness with their students. This study hopes that it will be able to facilitate the establishment of future certification instructor evaluation systems to help the certification education of Taiwan conform more to the values of "education."

Acknowledgments

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Note

Note 1. The practical teaching plan with the proposed certificate teaching model