The Courses Design and Training Strategy of Teachers Training with the Integration of Information Technology into Instruction

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Abstract-Using information technology to improve teaching effective is the major teachers' required skill in the 21st century. This study was to explore the process and performance of course design and strategies of training teachers with the integration of information technology into instruction. Literature reviews and document analysis had been conducted for training course project. Peer coaching and cooperative learning were strategies of the training project. Eight elementary school teachers were attended to be trained with the goal of applying information technology to their future teaching. When the learning was completed, on-line teaching materials were developed that can be actually used in instruction. This study used observation, questionnaires, and in-depth interview for data collection. In order to understand the training process of trainees' feeling in terms of curriculums, peer trainers, and corporative learning, systematic assessments were conduct before, during, and after the training program. Most teachers agreed that it would be of great help with the guided digitalized instruction through the training program. At the same time, peer coaching and cooperative learning strategies applied to teaching-training can really enhance learning effectiveness.

Key-words: Teachers training; Training strategies; Peer coaching; Cooperative learning; Integration information technology into instruction.

1 Introduction

Using information technology into instruction will be among the important issues in the 21st century when countries around the world implement reforms in educations. While using information technology (such as computers, the Internet and multimedia) in curriculum planning, teaching materials and instructional activities, teachers can support and extend the objectives of instruction to enhance students' understanding of

knowledge domains. In so doing, students can engage in meaningful learning activities in order to improve learning results, solve problems, and develop professional competitiveness (Morton, 1996; Sprague & Dede,1999).

However, difficulties have arisen in trying to implement and incorporate information technology into instruction. Educational Statistics in the United States indicate that less than 35% of teachers prepare their teaching materials for the classroom by using technology; in addition, few teachers have been taught to teach their subject matter with technology, only 20% of the current public school teachers feel comfortable to use technology in their teaching. Furthermore, up to 40% of teachers state that their students usually do not use computer during any given week (Intel e-Teacher Plan, 2004 ;Rosenthal, 1999).

Similarly, Taiwanese teachers lack basic information literacy, schools do not have sufficient hardware equipment and software resources, teacher training programs are not effective in helping teachers to elevate their information literacy, and teachers cannot obtain from the teacher training programs they have attended the concept of the integration of information technology with subject instruction (Ho, Jung-Kwei, Lan, Ju-Yu, 2000; Ho, Kwei-Jung, Lan, Ju-Yu, 2002).

The main purpose of this study was to integration of information technology into instruction for in-service training so as to effectively elevate teachers' informatics literacy, combine information technology with academic subjects, and integrate it into instruction. These courses made use of peer coaching and cooperative learning in the education and training of primary school teachers. It is expected that the models offered by this study

can help teacher training organizations, secondary and elementary schools that can integrated information technology into instruction.

This study reference resources the literature and actual examples of implementing information technology in USA, Singapore, Japan, China, and Taiwan (Intel e-Teacher Plan, 2004;Ho 2001; Mitchell 2003;PT3 2004; Zhang , Guo , Xia , Hu, & Li 2004) And discussed by the expert consultation to design the training strategies and course. In order to let trainee teachers not only learns information technology, but also can learn how to integrated information technology into instruction, research group decide to use peer coaching and cooperative learning for the strategies, and determine our concept on the design of training curriculum.

2 Method

Several research techniques are used in this study — including document analysis, expert consultation, participatory observation, and in-depth interviews. First, related literature and documents on teacher training that have integrated information technology in Taiwan and other countries were collected, and a draft of a training curriculum was designed and written. Then meetings were convened so that the

opinions of curriculum experts scholars and

experienced educators could be pooled and used in writing the plan and content of training curriculum. Then implement teaching, this plan was conducted over three-week training, period for 36 hours in total. After completion learning, the trainee was required to output report of findings websites of instruction and design of instructional activities . The Procedure of the study is as follows:
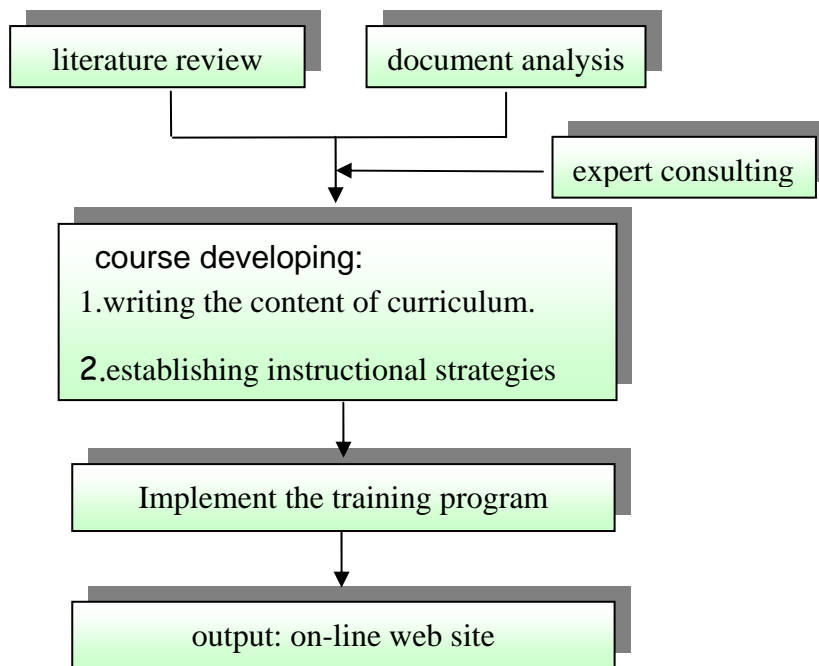
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│ literature review│    │ document analysis│
└──────────────────┘    └──────────────────┘
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│  course developing:                      │
│  1.writing the content of curriculum.    │
│  2.establishing instructional strategies │
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│     Implement the training program       │
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│        output: on-line web site          │
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Fig.1 The procedure of the study

2.1 Participants

Research group selected three information teachers in elementary or middle school and trained them as a seed teacher. Then, the plan was advertised in newspapers and screening was stringent. Finally, eight qualified in-service teachers (trainee) in Taiwan County and City were selected to participate in the curriculum training of this project to learn how to integrate the curriculum into four elementary school subject areas: social studies, science, math, and information security issue. In the training process, peer coaching and cooperative learning were used. Seed teachers instructed the trainee teachers use of information technology in these subject areas.

Among the eight trainee teachers, four of them female and the others are male. Seven of them were 20-40 years of age, and the other was 40-50 of age. As to teaching experience, six of them had 1-3 years, one had 7-9 years, and one had 13-15 years. The majority (7) had enrolled in related computer courses, and of these five had studied more than 16 hours.

2.2 Curriculum design

As for the design of the training curriculum, this study used the following criteria: The standards of the Basic Informatics Skills of Secondary and Elementary School Teachers established by the Ministry of Education (Ministry of Education, 1998), the Index of the Informatics Literacy and Skills of Secondary and Elementary School Teachers of Kaohsiung City (Information Education Center, Bureau of Education of Kaohsiung City Government, 2001), and the Standards of Educational Technology of ISTE teachers of the United States (2001). This study also reference to Intel e-teacher Plan (Intel e-teacher Plan, 2004) and the documented examples of applying information technology on instruction in many countries. The curriculum teaching materials progressed from easy to complicate and were divided into basic, beginning, and intermediate courses, consisting of 12 units. Each unit was taught in three hours. A detailed criteria of skills,

curriculum objectives, and curriculum content are listed in Table 1

Table 1 Curriculum plan

Level	Criteria of skills	Objectives of curriculum	Content of curriculum
Basic course (Basic concepts)	File management skills	➤ Get to know peers and establish file folders of instructional process	Introduction of curriculum, file management
	Informatics literacy skills	➤ Understand one's IT skills so as to enhance them	Informatics literacy
	Design learning skills	➤ Formation of project and share concepts ➤ Use Power Point to energize instructional design	Production of project
	Operating publishing software	➤ Use Publisher to produce DM's for instructional activities and Webpage teaching materials	Introduction of publications
Elementary course (Layout of Internet resources)	Searching for resources	➤ Make good use of search engine to complete the inventory for resources needs of instructional units	Information search
	Demonstrating instructional activities	➤ Use PowerPoint software to show design of diversified instructional activities	Production of PowerPoint
	Constructing interpersonal network beyond space and time	➤ Use Outlook Express and MSN to conduct instructional contact	Network of instructional contacts
	Managing and posting websites	➤ Use FrontPage 2003 to post instructional websites	Design of instructional websites
Intermediate course (Integration of resources)	Integrating web pages and database	➤ Use FrontPage 2003 to establish interactive instructional web pages	Advanced design of instructional websites
	Treating digital images	➤ Make good use of digital camera and graphic software Photo Impact to treat images	Treatment of digital images
	Multimedia integration skills	➤ Make good use of multimedia to present the content of teaching materials	Advanced treatment of digital images
	Designing instructional activities	➤ Advance self through peer sharing and observation and imitation	Exhibit of results

2.3 Tools and data collect

The tools used in this study included the training course developed by our team, Microsoft Office XP for Learning Projects, the self-written "Record of Classroom Observation of Instructional Activities," and questionnaires of various stages. The questionnaires included the initial questionnaire, the evaluative questionnaire of the first stage, the evaluative questionnaire of the second stage, the evaluative questionnaire of the third stage, the term questionnaire, and a check of self progress.

The eight teachers were given systematic evaluation before, during, and after the instruction. In addition to using questionnaire surveys to conduct quantitative statistics and analysis, such methods as classroom observation and semi-structured interviews were used to collect data so as to understand what impeded the trainee teachers in their learning to use information technology in.

2.4 Data analysis

Percentile statistics were used to Questionnaire analyzed, more than 70% agrees they were learn enough methods implement information into teaching, more than 60% agrees the training strategy let training have good results.

The observation records of instructional activities in classrooms and the records of semi-structured interviews were made on site.

After the observation, transcribed and qualitative analysis, especially the encoding and decoding of data was conducted in order to understand the learning progress, mental process and likely difficulties encountered by the instruction.

3 Results and Discussions

Before the curriculum, a pre-test was conducted to collect personal data of trainee teachers such as the personal background variables, basic computer literacy, and their understanding of information technology. These data would help the instructors (seed teachers) to understand the starting behavior of the trainee teachers so as to facilitate instructional activities. As to basic computer literacy, all of them were not afraid of using computer. They could send and receive e-mail messages, browse Web pages, upload and download files.

3.1 Analysis and discussion of the results

After learning for 36 hours, it could be clearly observed from the questionnaires that the trainee teachers had considerably progressed in basic computer literacy and in the understanding of information technology. Through learning, they could more systematically manage their instructional data, knew much more clearly what they should improve in the future, knew the importance of intellectual property rights, cyber ethics and cyber security, knew how to make better use of digital equipment and Internet resources, and knew more about designing Web pages.

From classroom observation, it was clear that in addition to traditional instruction, learning through peer-experience sharing, interactive discussions, and with the pressure to demonstrate results could achieve better effectiveness.

3.2 Analysis and discussion of interview records

The trainee teachers believes that the above strategies could increase the effectiveness of learning and facilitate interaction, because of the seed teachers can understand the question and need even more, and cooperative let study be faster. They considered that these strategies had great benefits in increasing learning effectiveness.

From the teachers interviewed, research group found that the curriculum content greatly strengthened the teachers' skills in integrating information technology into instruction. As to which was the most practical component of the instruction, trainee teachers had their own feeling, but they all concerned that they had benefited a lot.

During the training period, these trainee teachers did not attend other IT course or program. In this regard, research group have more confident to say that our study is not threaten by outside events that might have effect on the result of our training.

3.3 Teachers' learning achievements

Research group hope that the training strategy in this study can help teachers to improve the ability of applying information technology to their course design and thus promote their teaching effective. After learning this course, the teachers had very positive and fruitful learning experiences. Teachers' learning achievements are presented as the following:

1.Mathematics--Websites of instruction
   (http://pilot.stu.edu.tw/plan9/site1/index.htm)
2.Science--Websites of instruction
  (http://pilot.stu.edu.tw/plan9/site2/INDEX.HTM)
3.Social studies--Websites of instruction
  (http://pilot.stu.edu.tw/plan9/site3/index.htm)
4.Information security-- Websites of instruction

(http://pilot.stu.edu.tw/plan9/site4/index.htm)

4 Conclusions

From the learning results and interviews with the trainee teachers, it was clear that the curriculum design of this study, use of such strategies as peer coaching, cooperative learning, were very successful. The evidences of successfulness include that the seed teachers can understand the question and need even more, and cooperative let study be faster, the trainee teachers learned new knowledge and new skills through interactions. Through observation and imitation, they also learned various methods of integrating information technology with instruction. Under the pressure of presenting their results, they completed stylish websites of their own and completed teaching materials that could actually be used in the classroom.

According to the results of this study, the following suggestions were put:

1. The training strategy of peer coaching and cooperative learning are useful with integration of information technology into instruction.

2. The most important thing to design of the training course is teaching teachers how to apply IT on their instruction, not just learning IT skill.

3. Training programs should take teachers' needs and ability into account. Teachers with different levels of skills should be given teacher training programs that are suitable to their levels.

4. In the future, ones can develop these teaching materials into training course of on-line web site that hope expanding the IT training on teachers.

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