Effective Use of Online Video Cases in a Technology Course for Pre-service Teachers

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***Abstract*—The purpose of this study was to investigate the effective use of online video cases in a technology course for pre-service teachers. According to the topics covered in the course, video cases were selected, analyzed, and discussed. A questionnaire on perception of technology integration was administered as a pre and post-test. A second questionnaire was administered in the final session to evaluate the degree of benefit from different type of activity implemented in this course. The results showed statistically significant effects of the technology course on pre-service teachers' perception toward technology integration, especially in perceived abilities and usefulness. The activity of software demonstrations and exercises had the highest degree of benefit among all the activities although pre-service teachers did highly recognize the use of video cases. Accordingly, strengths and limitations of online video cases in technology training for pre-service teachers were discussed and relevant suggestions were provided at the end.**

Keywords-online video cases; pre-service teachers; teacher preparation; technology integration; technology training

I. INTRODUCTION

In today's information society, it is necessary for future teachers to know how to use technology effectively to help students learn. In Taiwan, the Ministry of Education has recommended "Instructional Media and Operations" a required course for pre-service teachers. In addition, many teacher education programs have offered an elective course "Computers and Instruction" so as to enhance pr-eservice teachers' technology competencies. However, such courses of instructional technology often stress on computer skills and generally lack teaching demonstrations and inspirations [1]. In view that pre-service teachers' technology training is often disassociated from the teaching field and its technology applications seldom focus on specific content area, Brush, et al. (2001) strongly suggest to link university curriculum to K-12 teaching fields and to bring authentic teaching situations into university classrooms [2]. One way with few disturbances to the teaching field and with the luxury of revisiting the same site a limitless number of times is the use of videos to reappear the school's reality.

These videos, which provide teaching reality in authentic classrooms, are considered as good resources for case-based instruction [3]. For example, Perry and Talley (2001) employ video case studies for pre-service teacher preparation to promote knowledge construction about integrating technology into the curriculum [4]. Ertmer, Deborah and Judith (2003) also develop VisionQuest multimedia discs, which demonstrate the school teachers' use of technology in their teaching, so as to improve pre-service teachers' perspectives of technology integration [5].

To bridge theory with practice, a web system of video case studies (VCS) has been developed and applied in a technology course for pre-service teachers [6]. Furthermore, its effects on pre-service teachers' competencies of technology integration have been investigated, and the results indicated a professional growth in observation skills, flexibility on applying technology, multiple use of technology, and multiple perspectives in dealing with teaching problems [7]. However, it was found that the pre-service teacher's confidence and belief about technology integration in instruction needed to be enhanced.

This study aims to explore the effective use of the VCS system's video cases in the same technology course offered in the following year, that is, the spring semester of 2010. Based on the prior empirical findings, the application of online video cases was modified, and the overall effect of the course on student perception of technology integration was examined. Furthermore, compared to other activities, perceived benefits of online video cases were investigated. Finally, strengths and limitations of online video cases in technology training for pre-service teachers were discussed and relevant suggestions were provided accordingly.

II. COURSE DESIGN

A. Overview of the Course

The course "Computers and Instruction" was one of the two required technology courses in our secondary teacher preparation program. The course was offered in the spring semester of the first-year teacher preparation program. Its goal was to familiarize pre-service teachers with current technological products and their instructional applications. Most importantly, from this course students were able to understand theories and practices of technology applications in instruction, and obtain high motivation and competences to implement technology integration in their future classrooms. According to the course objectives, topics and assignments designed for each class session were displayed in table I.

TABLE I COMPUTERS AND INSTRUCTION: SCHEDULE FOR SPRING 2010

Session	Topics and Assignments
1	Course overview and introduction
2	Technology applications in learning and instruction
3	Web resources and instructional applications Assignment: Web resource report for a subject matter
4	Case analysis and discussion of using web resources in teaching
5	Instructional applications of electronic spreadsheet Assignment: Excel exercise
6	Instructional applications of graphics and animations Assignment: PhotoImpact exercise
7	Case analysis and discussion of using animations in teaching
8	Courseware demonstrations and applications
9	Technology integration into different subject matters: discussion of a case selected by each group Assignment: Technology integration lesson plan design
10	Case analysis and discussion of digital showcase of student work
11	Teaching observation in the field Assignment: Field observation report
12	Discussion about field observation of technology integration
13	Project-based learning and examples of its applications
14	Future of information technology education; Final project presentation I
15	Final project presentation II Assignment: Observation & reflection report

This course used the open cyber classroom as a platform for students to download instructional materials and upload their assignments or exercises. The platform's operation was quite easy and it had the function of allowing students to access to and download other students' assignments.

B. Video Cases in the VCS System

The cases in the VCS system were collected from three secondary schools in Taiwan, and two of them have been awarded "information seed model schools" with more resources and enthusiasm in implementing technology integration into instruction. All together, there were seven teaching demonstrations covering seven different subjects as bases for video case development. Every teaching demonstration was then edited into two to four video clips. There are a total of 22 video clips, and each video clip is treated as a single video case in the VCS system [6].

The documents or information data related to a video case was organized into a case study pack, which consisted of five elements, namely, background information about the case school and the teacher, teaching materials such as slides and worksheets, a 3-8 minute video clip with subtitles, feedback from the teacher and the students, and an analysis worksheet containing video observing guide, reflective questions, and suggested activities so as to help the student work on a video case in a more systematic way [7]. The diagram of the case study pack is displayed in Figure 1, and four layouts are presented in Figures 2 to 5.

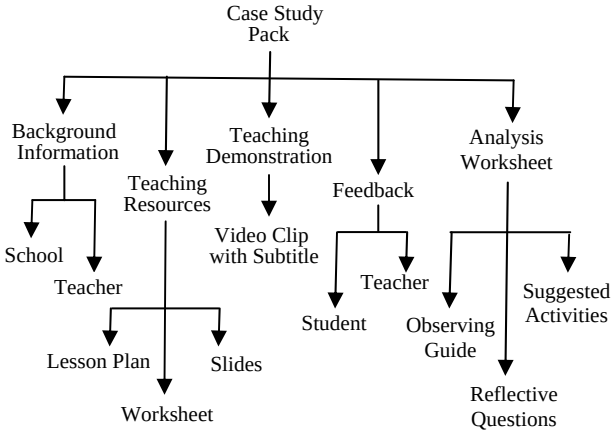

Figure 1. Diagram of the VCS system

Figure 2. Title page of the VCS system

Figure 3. Display of all the cases

Figure 4. A case selection page

Figure 5. Layout of a video case

C. *Application of On-line Video Cases*

Different from the application in the previous study [7], this study incorporated video cases into relevant weekly topics or activities so as to build a strong connection between technology and application in authentic classrooms as shown in Table I. Hence, the use of a case was distributed over the whole semester. Furthermore, there was a fourth case selected by each group in session 9 for two purposes. The first purpose was to correspond to the weekly topic: Technology integration into different subject matters. Therefore, students were allowed to select the case related to the subject they are going to teach. The second purpose was to give students some implications of technology integration into a certain subject so as to help them with their lesson plan design assignment which was a part of the final project.

The process of applying a case in a class session for about 100 minutes was illustrated as follows:

- The instructor pointed out the technology integration focus of the session and reminded what had been taught in the previous session.
- The instructor specified a video case from the VCS system and gave it a brief introduction.
- The student downloaded the case's analysis worksheet from the platform and independently responded to the questions on the sheet by examining the case's video clip and background information.
- The student uploaded the completed sheet to the platform and discussed the case with group members. A group consisted of three to five members whose subject specifications were the same or similar.
- The instructor asked some groups to present their viewpoints and, at the same time, invited the whole class to participate in the case discussion.
- The instructor brought up some important but apparently ignored issues for discussion, and finally summarized the key points of the case.

D. *Follow-up Activities*

As suggested by the previous study [7], to increase the student's practical experience, two activities were provided, namely, field observation and teaching demonstration. The activity of field observation intended to give students a sense of ambiance about technology use in the classroom. Since it was difficult for the whole class to negotiate a schedule for a field visit, the student was allowed to decide when and where to observe the teaching demonstration on technology integration as long as the classroom was either in K-12 schools or on a university. Afterwards, they had to write a field observation report including a description of the teaching procedure, and a reflection of this teaching demonstration. Then there was a session for students to share their opinions with the whole class.

The activity of teaching demonstration urged the student to actually implement technology in classroom teaching. The whole procedure included the following:

- Write a technology integration lesson plan (at least for one class period) and modify it according to the instructor's suggestions.
- Collect or produce related digital materials for the lesson plan.
- Prepare a 15-minute teaching demonstration, an excerpt from the lesson plan, and have it video recorded.
- Present in class the final project including lesson plan, digital materials, and the video of teaching demonstration.

Through accumulation of personal practical experience, it was assumed that the student's confidence in implementing technology integration in the classroom might be greatly increased [8][9].

III. METHOD

A. *The Participants*

There were 25 students in the course and all of them participated in this study. Among them, 68% were females, 32% were males; 60% were college students and 40% were graduate students. The subject matters that most participants would be teaching were English (44%) and Chinese (28%), followed by Mathematics, and Science (16%). In all, 72% of the participants rated their abilities of Internet use as "fair," while 16% and 12% of them rated as "good" and "bad" respectively. Moreover, there were 52% of the participants reporting their Internet use was about 2-5 hours every day, 16% of them reporting 1-2 hours, 12% of them reporting 5-10 hours, while 8% reporting less than an hour. On the whole, participants had good abilities and positive attitudes towards internet use. This provided a favorable condition for the use of video cases on the web.

B. *Instruments*

Two surveys were developed to measure the use effects of online video cases and other class activities in a technology course for pre-service teacher. One was a questionnaire designed to measure student perception of technology integration into instruction focusing on three categories. The first category consisting of items 1-4 aimed to measure the student's perceived usefulness and importance of technology integration; the second category consisting of items 5-9 aimed to measure the student's willingness and eagerness of implementing technology integration; and the third category consisting of items 10-15 aimed to measure the student's perceived abilities of integrating technology into instruction. Using a Likert-type

scale of 1-5, the questionnaire contained 15 items and five of them were reversed items.

The other was a learning benefit questionnaire designed to evaluate the degree of benefit from 1 (the least beneficial) to 5 (the most beneficial) of eight different types of activities implemented in this course. In addition, there was an open-ended question asking students to write down the benefits they experienced in using online video cases.

C. Data Collection and Analysis

The questionnaire of student perception of technology integration was administered in the first and final class sessions; while the learning benefit questionnaire was only administered in the final class session. Since the surveys in this study used a Likert-type scale of 1-5, the score for each item ranged from 1 to 5. Furthermore, since the items marked reverse were stated in a negative manner, the scoring system for such items has to be reversed. Finally, a paired-sample t-test was conducted to detect the mean differences between pre and posttest of student perception of technology integration. As for the open-ended question, the first step of analysis was to examine all the responses so that certain themes or categories might emerge, followed by classifying the responses according to the categories, and finally calculate the number of occurrences in a category.

IV. Results and Discussion

A. Change in Perception of Technology Integration

The internal reliability of the perception questionnaire was calculated, and its Cronbach's alpha coefficients were greater than .91 for both the pre and post-test. As shown in Table II, the mean score of willingness in the pre-test was more than 4.25, the highest of the three categories. That indicated that the students who took this course already had a high motivation for technology integration. However, they perceived that their abilities of implementing technology integration were low, the lowest of the three categories. Fortunately, their abilities were perceived a significant increase after they completed the course (t=4.65, p=.000 <.01). Similarly, significant differences also existed between the pre and post-test in the category of perceived usefulness (t=2.34, p=.021 < .05), but not in the category of willingness since its pre-test score was already high. As a result, significant differences were found between the pre and post-test in the total measure of student perception (t=4.24, p=.00 <.01)

TABLE II Descriptive Data and Results of paired-sample t Test

Category	Pre-test		Post-test		*t* value	Probability
Usefulness	4.10	0.64	4.28	0.67	2.34[a]	.021
Willingness	4.26	0.61	4.24	0.71	0.25	.801
Abilities	3.63	0.89	3.97	0.75	4.65[b]	.000
Overall	3.96	0.79	4.14	0.73	4.24[b]	.000

[a] $p < .05$; [b] $p < .001$

These results are in general agreement with previous research that technology courses can enhance pre-service teachers' perception of their competencies in using technology for teaching and learning [10][11]. In addition, these results showed that the use of video cases followed by activities, such as field observation, lesson plan design and teaching demonstration, to provide pre-service teachers with experiential learning were effective for raising their confidence in competencies of using technology in their own teaching as well as enhancing their belief in usefulness of technology integration.

B. Benefit of Different Type of Activity

As shown in Table III, all the mean scores were above 4.0 except that of lectures and class discussion. The results indicated that the student perceived almost all the activities of this course as very beneficial. The activity of software demonstrations and exercises obtained the highest mean score of benefit, followed by the final project and presentation, and then discussion about field observations; whereas, the activity of lectures and class discussions appeared to have the lowest score, followed by the activities related to video cases observation, analysis, and discussion.

TABLE III Descriptive Data of the Benefit Questionnaire

Activities	Mean	SD
1. Lectures and class discussions	3.92	0.76
2. Software demonstrations and exercises	4.28	0.74
3. Video cases observation and analysis	4.01	0.82
4. Group and class discussions on video cases	4.01	0.82
5. Teaching observation and analysis in the field	4.04	0.73
6. Discussion about field observations	4.12	0.78
7. Teaching demonstration and video recording	4.08	0.81
8. Final project and presentation	4.20	0.65

These results again confirm the importance of hands-on experience so as to establish a strong knowledge base from which effective technology integration ideas can flourish [12]. Furthermore, authentic experience of lesson design and teaching demonstration in the final project helped pre-service teachers make stronger connections between their technological skills and technology integration practice. Such experience was effective and beneficial for developing competencies of technology integration [13]. Finally, the activities of video cases, not receiving very high scores, still had specific benefits for this course as shown in the open-ended question.

C. Benefits of Online Video Case

Analysis of student responses to the open-ended question was summarized as follows: Firstly, most students highly recognized the use of video cases in this course. Secondly, half of the students expressed that through the use of video cases, they realized the effects of using technology and understood how to apply technology to instruction. The result was consistent with that of the perception

questionnaire and previous research [14]. Thirdly, about 40% students considered it a valuable opportunity to observe teaching demonstrations in authentic classrooms. Such demonstrations were regarded as exemplary models not only in technology integration but also in general teaching pedagogies, such as teacher-student interaction, teaching or learning process management, and so on. A student wrote, "The teaching techniques adopted by the teachers in the videos and their interaction with students really inspired me very much."

In other words, these video demonstrations were able to stimulate insights regarding teaching and learning in authentic classrooms, as well as raise practical issues that these pre-service teachers might need to address and reflect on in their future classrooms. Finally, some students indicated that they learned how to use videos to facilitate student learning in future classrooms. The result implied that student personal experience in using technology for learning was more likely to transfer to his or her own teaching in the future [15].

V. Conclusion

For effective use of online video cases, this study designed and implemented practical activities such as field observations and teaching demonstrations in a technology course for pre-service teachers. It was found that such activities providing students with experiential learning in integrating technology in instruction were able to enhance the effects of online video cases. As a result, the students' perceive abilities and usefulness of technology integration were significantly improved after they completed the technology course. The results also implied a significant increase of student confidence and belief in applying technology in future classrooms.

In summary, online video cases provide students with vicarious experience so that the student's interest or curiosity may be stimulated, and many ideas or insights may be inspired by observing the video. Furthermore, critical issues may emerge from video analysis at the same time. These are all the strengths of applying video cases. Nevertheless, vicarious experience cannot replace direct experience, and experiential learning is especially important for technology training since its aim is to enable students to integrate technology in their future classroom. Hence, the use of video cases is crucial but not adequate for a technology course. Practical activities, such as field trips, lesson plan design, and teaching practices, followed by reflection and experience sharing, should be all included in technology training to increase its overall effects. In other words, as technology offers great promises in learning, it brings more challenges to educators at the same time. Consequently, more empirical studies of technology applications in instruction are beneficial so that we may fully take advantage of its strengths and take care of its limitations for best benefits of student learning

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