The Development of an Instructional Model with the Use of Interactive Webcast for Sukhothai Thammathirat Open University Students

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ABSTRACT

The purposes of this research were 1) to develop instructional model via interactive webcast 2) to study learning achievement of students learning via interactive webcast and 3) to study opinions of students learning via interactive webcast for STOU's students. The subjects used in this study were 30 students of 30205 Mathematics and Statistics in Business Administration Programme and 30 students of 54113 Industrial Hygiene: Evaluation in Public Health Programme who enrolled in the first semester of 2009. Research instrument for data collection comprised an instructional model, quality evaluation form, evaluation form for pre-test and post-test and opinion questionnaire. Data were analysed using percentage, mean and standard deviation. Research findings were: 1) the developed instructional model via interactive webcast composed of five steps: analysis, design, production and development, implementation and evaluation; 2) comparison result of pre-test and post-test illustrated that post-test score was higher than pre-test; and 3) opinions of students about learning via interactive webcast were at high/good level.

INTRODUCTION

As an open university, Sukhothai Thammathirat Open University (STOU) adheres to the principle of lifelong and life-along learning that aims to develop quality of life, upgrade qualifications of the workforce, expand educational opportunities and impart knowledge as well as experiences to learners by mixed media appropriate to societal basic infrastructure and readiness of learners through diverse means thus enabling their independent study without having to enter conventional classrooms. (Sukhothai Thammathirat Open University, 2001:1, Wichit Sirsa-an, 1986:5-6).

Since STOU's establishment, the mixed media at the first stage in 1980 comprised printed matter, the main media included learning materials, i.e., textbooks and workbooks dispatched by STOU to all students for self-study on their own, l at convenient times. The helpful supplementary media that enhanced students' understanding about academic content and experience were radio programmes, television programmes and tutorial sessions. Also, audio cassette tapes, videos and movies were employed as STOU supplementary media later on. These media were then transformed into voice CDs, picture CDs and multimedia CDs. To achieve the University 2004 strategic plan for the development of STOU as an e-university, the expansion of instruction arrangement has increasingly and considerably been supported by the information technology and communication system. Implementation of e-learning, both online and offline, were introduced to the STOU academic management (Patamaporn Yenbamrung and team, 2005:1-2, Vipa Jaroenpuntaruk and team 2006:1-2). It is obvious that STOU supplementary media assisting different learning of students is diverse and subject to change and develop in accordance with changing educational technology due to advanced information technology.

To date, distance tutorials by webcast seem to be another type of distance education management in electronic system that allow all students everywhere to learn from the same lecturer via the Internet. At the same time, students are able to interact with their lecturers and fellow students any time they wish. The use of webcast as media in educational management will present the prepared academic content systematically with computer efficiency delivering educational content to learners in the form of mixed media, i.e., pictures and voice content. Interaction between students and lecturers can take place right away. Interaction is regarded as crucial, as it increases efficiency of the learning process. Lecturers can raise questions or evaluate the level of understanding of learners. Apart from this, interaction provides learners with opportunities to question, share their views or interest among themselves leading to an efficient and effective distance learning approach. (Chaiyong Brahmawong, 1997:36*)*

For this reason, instructional management by interactive webcast has turned out to be an alternative actively supported by STOU. In this study, the researcher picked a subject out of the mathematics group, namely, Mathematics and Statistics due to high rate of student failure. Telephone inquiries with the Office of Registration, Records and Evaluation obtained statistics of students who failed in Mathematics and Statistics in the semesters of 1/2004, 2/2004, 1/2005, 2/2005, 1/2006, and 2/2006, indicating the following percentage of student failure: 58.41, 59.78, 74.40, 70.91, 61.44 and 86.99 respectively. Another selected subject was the Science group, namely, Industrial Hygiene Evaluation. The reason this subject was chosen is the emphasis on knowledge

concerning evaluation principles in Industrial Hygiene Evaluation. Students were expected to be able to use equipment and tools during the environment inspection and environment evaluation which required skills practice for learners. Development of the subject that required skills practice would constitute an innovation beneficial to STOU distance teaching and learning system. The research team, therefore, chose to develop the above-mentioned two subjects employing the interactive webcast through a lecture and systematically prepared media transmitting to students in remote areas at the same time via the Internet. Interaction arrangements between lecturers, students and fellow students can really happen while teaching is going on. Results from teaching and learning duration or learning achievement including students' opinions towards the interactive webcast can be studied in order to acquire educational media innovation which is another alternative for STOU distance education management.

OBJECTIVES OF THE STUDY

This research studied the development of an instructional model with the use of interactive webcast as another educational media innovation for STOU distance education management. Purposes of the research were as follows.

1. To develop the instructional model with the use of interactive webcast for Sukhothai Thammathirat Open University students.
2. To determine learning achievement of Sukhothai Thammathirat Open University students who studied via interactive webcast.
3. To study opinions of Sukhothai Thammathirat Open University students towards the instructional model with the use of interactive webcast.

Research scope composed of the following two sub-research projects

Sub-project 1: The development of an instructional model for the mathematics group with the use of interactive webcast for Sukhothai Thammathirat Open University students. Content used: Course 30205 Mathematics and Statistics, Unit 6 Basic Analytic Geometry.

Sub-project 2: The development of an instructional model for the science group with the use of interactive webcast for Sukhothai Thammathirat Open University students. Content used: Course 54113 Industrial Hygiene Evaluation in three areas – evaluation of heat touch, evaluation of loud noise touch and intensity of light measurement.

METHODOLOGY

Population and Sample

The population was the bachelor degree students registered in semester 1/2009. The two sample groups were as follows.

1. Thirty students from the School of Management Science, who registered in the course 30205 Mathematics for the first time in semester 1/2009, selected by purposive sampling.

2. Thirty students from the School of Health Science, Department of Public Health Science, Major: Occupational Health and Safety, who had never registered in the course 54113 Industrial Hygiene Evaluation, in semester 1/2009, selected by purposive sampling.

Research Instruments

Research instruments composed of:

1. **Instructional model with the use of interactive webcast.**
   The research team conducted the instructional analysis following the ADDIE Model by organising components for the instructional model with the use of interactive webcast through providing content for each lesson, and instructional activities in the form of exercisse, 6 to 10 items for students, upon completion of their lessons. The instructors explained how to do the exercises. Those who did not understand the lessons were welcome to forward inquiries to instructors by telephone.

   There were two types of interaction between instructors and students as follows:

   (a) Response to students' questions or communication with students via e-mail/chat online.

   (b) Inquiry via telephone while the instruction was going on.

2. **Evaluation Form on the quality of the instructional model with the use of interactive webcast.**
   This is the 5-Rating Scale model for quality evaluation covering four aspects, namely, content, content presentation technique, media presentation technique, pre-test/post-test and open-ended questions for evaluators' comments or recommendations.

3. **Test Form on learning achievement for the instructional model with the use of interactive webcast.**
   Test Form on learning achievement composed of the following:

   (a) Pre-Test on learning achievement to evaluate students' original knowledge, that is, an objective test comprising 10 items with four choices.

   (b) Post-Test on learning achievement to evaluate students' knowledge after their studies, that is, an objective test comprising 10 items with four choices in parallel with the Pre-Test.

4. **Questionnaires on opinions towards the instructional model with the use of interactive webcast.**
   The questionnaire was to measure students' satisfaction towards the instructional model with the use of interactive webcast when the instruction was over. It was 5-Rating Scale for quality evaluation covering three aspects, namely:

   (a) Learners' interest

   (b) Lesson's content

   (c) Lesson design and open-ended questions to obtain evaluators' comments or recommendations.

Data Collection

Data were collected from the sample groups at Sukhothai Thammathirat Open University campus who attended the instruction from computer screens while lecturers conducted their instruction via webcast network. The process started with orientation, pre-test, learning via webcast network, post-test and interaction between lecturers and learners. Data analysis included percentages, means ($\overline{X}$) and standard deviations (S.D.).

RESEARCH FINDINGS

1. The instructional model with the use of interactive webcast

The instructional models with the use of interactive webcast for both the mathematics and science groups were developed from the ADDIE Model via the following steps: (1) Analysis (2) Design (3) Development (4) Implementation and (5) Evaluation. While the mathematics group's instructional model with the use of webcast followed five steps, the science group's model comprised 4 steps. The last step combined implementation with evaluation. In principle, however, the instructional steps remain unchanged according to the ADDIE Model.

The difference of both groups' instructional model with the use of interactive webcast was the design, particularly, the instructional design for academic content, media and evaluation. The design would be in line with the characteristic nature of the content, learners' condition, problems encountered, and circumstance of learning resource location. The other steps followed the same principle.

The synthesis and integration of the results from the two sub-projects showed that they could be clearly linked as the instructional model with the use of interactive webcast as shown in Figure 1:

The Instructional model with the use of interactive webcast comprised 5 steps as follows.

Step 1 Analysis

1.1 Problem Condition Study. To analyse instruction by distance education system. Most of the instructional media was one-way media while two-way media was used less, specially, the face-to-face communication between students and lecturers.
1.2 Students' Evaluation. To analyse foundation knowledge, skill, capability and potential readiness of students in computer and internet use.
1.3 Evaluation of Learning Resource Location. To analyse physical circumstances, tools, equipment, subject and the instructional model with the use of interactive webcast.
1.4 Consideration of Current Situation. To analyse the needs of using two-way media to encourage interaction via webcast.

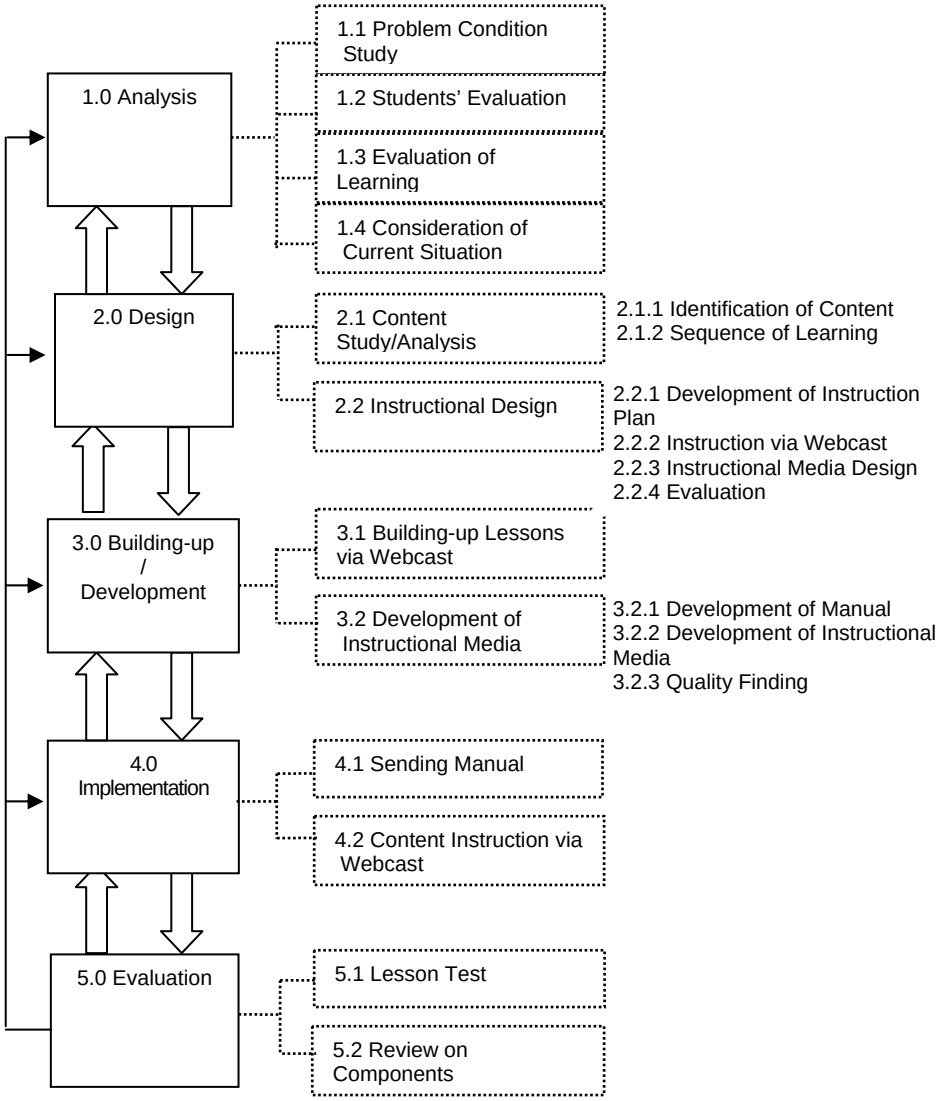

Figure 1: The instructional model with the use of interactive webcast

Step 2 Design

2.1 Content Study, Analysis and Synthesis

2.1.1 Identification of Content. To study content, identify learning objective.

2.1.2 Sequence of Learning. To put process in order by using content to identify instructional details together with other interesting instructional activities.

2.2 Instructional Design

2.2.1 Development of Instruction Plan. To identify and divide learning units, expected time to spend for each lesson, how to present, activity, teaching media and evaluation form in accordance with content and identified objective.

2.2.2 Instruction via Webcast. To teach as virtual classroom at scheduled period that allowed students to study via the Internet and interact by asking lecturers via phone.

2.2.3 Instructional Media Design. To consider and review model of instructional media in accordance with the content and learning objectives.

2.2.4 Evaluation. To plan and build up instruments and examine efficiency of the instructional management with the use of interactive webcast.

Step 3 Building-up/Development

3.1 Building-up Lessons via Webcast. To develop lessons earlier planned, instruction to impart knowledge through activity and instructional media and build-up the following instruments.

(a) Evaluation Form for the instructional model with the use of interactive webcast.

(b) Pre-test and Post-test Form

(c) Questionnaires seeking students' opinions towards the instructional model with the use of interactive webcast.

3.2 Development of Instructional Media

3.2.1 Development of Manual. To develop relevant document as advice for students to gain knowledge, better understanding, awareness of the importance of instruction with the use of interactive webcast.

3.2.2 Development of Instructional Media. To produce instructional media by coordinating with the production team, production procedures and checking instructional media before using.

3.2.3 Quality Finding. To find quality from the evaluation survey of the instructional model with the use of interactive webcast.

Step 4 Implementation

4.1 Sending Manual. To keep students prepared prior to learning via interactive webcast.

4.2 Content Instruction via Webcast. Employing a process of instructional model with the use of interactive webcast.

(a) Pre-instruction. Lecturer notified of learning objectives, examined students' foundation knowledge by pre-test form.

(b) Instructional Implementation. Using the instructional model suitable for content and learning objectives that were already designed and found to be of quality.

(c) Post-instruction. After each lesson, lecturer summarised, revised content taught, proposed activity for students to check knowledge students obtained.

(d) During activity. To interact between lecturer and students providing students with opportunities to inquire.

(e) Post-activity. To give answers after completion of each lesson, so as to get immediate feedback from inspired students.

(f) Post-instruction. Post-test forms were distributed to students for further instructional evaluation.

(g) Informed the results of pre and post-test to students. To welcome any question students may have to ensure correct knowledge in what they learned.

(h) Post-instruction. Students answered the questionnaires regarding opinions towards the instructional model with the use of interactive webcast.

Step 5 Evaluation

5.1 Lesson Test. To evaluate instruction results from test, interaction between lecturer and students including students' activities.

5.2 Review on Components of Instructional Model. Results obtained from instructional evaluation, questionnaires from students were improved and developed for a perfect instructional model with the use of interactive webcast.

2. Learning achievement of Sukhothai Thammathirat Open University students learned from the instructional model with the use of interactive webcast.

From the development of the two sub-projects instructional model with the use of interactive webcast and experiment with the sample groups, it was found from the mathematics group that learners gained higher marks after learning via webcast than before learning via webcast with the mean of marks before learning at 2.43 (SD = 1.25) while the mean of marks after learning was 4.50 (SD = 1.25). As for the science sample group, the same results were also found, that learners gained higher marks after learning via webcast than before learning via webcast, with the mean of marks before learning at 6.63 (SD = 2.68) while the mean of marks after learning was 12.40 (SD = 2.80).

3. Opinions of Sukhothai Thammathirat Open University students towards the instructional model with the use of interactive webcast.

From opinions of both groups of students towards the instructional model with the use of interactive webcast, it was found that overall picture was at high level.

Mathematic students' opinions towards the instructional model with the use of interactive webcast; their learning interest was at a high level ($\overline{X}$ = 4.15, SD = 0.52), lesson contents was at high level ($\overline{X}$ = 4.27, SD = 0.62), lesson design was at high level ($\overline{X}$ = 4.07, SD = 0.67) overall picture was at high level ($\overline{X}$ = 4.16, SD = 0.60).

Science students opinions towards the instructional model with the use of interactive webcast; contents were at high level ($\overline{X}$ = 4.32, SD = 0.67), presentation was at high level ($\overline{X}$ = 4.08, SD = 0.75), interaction was at high level ($\overline{X}$ = 3.82 , SD = 0.91) , evaluation was at high level ($\overline{X}$ = 4.05, SD = 0.70) overall picture was at high level ($\overline{X}$ = 4.06, SD = 0.75).

DISCUSSION

1. The instructional model with the use of interactive webcast.

Instructional management via the use of webcast was studied. Since webcast technology is a kind of data spread by data compression technology, streaming technology that effectively improved speed to link with Internet and computing technology for data transfer by compressing digital signal via IP internet with data compression technology in downsizing a file. Consequently, less time would be spent to download a file. Streaming technology has made viewing and listening possible at the same time while downloading. Technology speedily improved to link with internet which enabled virtual viewing and listening. The signal compression technology, Window Media Player, will manage flowing data continuously and regularly. This will eliminate previous difficulties in sending or receiving a big file. Computer with low efficiency will delay data processing of a big file. This may cause freeze frame or missing sound or even sound and video are not synchronized.

The instructional model with the use of interactive webcast proved to be another fast and convenient channel for students' educational assistance. Learning materials can be downloaded in advance. When participating in the instruction via Internet, interaction took place during the lecture in many ways, e.g., by expressing views, posting questions on web board, chat room, e-mail, or other dialogue programmes such as MSN and ICQ. Moreover, live questions and fax were also welcome. Students could fax their questions to the studio when instruction was going on. The questions were answered once each instruction session was over. For those who happened to miss any instruction programme, this can be followed via the webcast network that will be placed on demand

The development of the instructional model with the use of webcast, therefore, is an instructional innovation of STOU distance education to make use of network attributes, the technology with high efficiency and diversity of services to support and benefit instruction in the distance education system. Students living in different regions will be able to study together via the Internet at the same time. They are encouraged to inquire, communicate, share their views, e-mail or even chat online with the lecturer or fellow students as soon as the instruction is over. For students who missed the class, the learning materials will be made available on demand. It is obvious that the above-mentioned instruction model has greatly become another channel applicable to the instructional management for STOU students. Preparations for instruction circumstance with the use of webcast as media to transfer academic content must be systematically based upon principles and system design methods.

2. Learning achievement of STOU students who learned from the instruction with the use of webcast.

From the development of instructional model with the use of interactive webcast of the two sub-projects, it was apparent that students gained higher learning achievement after the instruction with the use of interactive webcast with the advantages of design according to relevant principles and theory. Furthermore, this model was examined and improved by experts prior to the experiment. Hence, the instructional model with the use of interactive webcast has satisfactory quality which resulted in efficient instruction and students gained higher marks after their study via webcast.

3. Opinions of STOU students towards the instructional model with the use of interactive webcast.

Students of both academic groups expressed their opinions in every aspect of evaluation towards the instructional model with the use of interactive webcast. According to their opinions, the quality was at good/high level.

Such confirmation indicated the developed instructional model with the use of interactive webcast is of efficiency and usefulness for STOU instructional management. Despite limitations of place, activities organised for students were considered direct experiences from their lecturers. Interaction opportunities between lecturers and students, questions and answers, as well as feedback during the instruction session truly affected students' learning achievement. In addition, most students strongly agreed with the instructional model via the use of interactive webcast. This appropriate model is most likely to be employed further in STOU distance education management. Hopefully, learners will gain increasing benefit to achieve their academic goals.

RECOMMENDATIONS

1. Any university wishing to adopt this instructional model must be fully prepared in terms of having the basic technological infrastructure and capable personnel to successfully produce the instructional model with the use of interactive webcast.

2. To employ the instructional model with the use of interactive webcast, the university must consider readiness of lecturers and learners in terms of technology usage, i.e., e-mail. Either lecturers or learners must be empowered with the capability and potential to correspond via e-mail in order to enhance mutual communication and efficient interaction, an advantage for successful instruction.

3. In-house training is recommended for lecturers and producers regarding the system design, instruction, production and instruction with the use of interactive webcast to ensure active interaction from the designed instruction which is the core element of this instruction model. Anyway, this interaction must generate learners' inspiration to actively pay attention, practise and follow up until the instruction is over.

REFERENCES

Chaiyong Brahmawong. (1997). Borderless Education System (SUT Plan) in *Processed Content Document, Overview of Borderless Distance Education*, Nakhon Ratchasima: Committee for Distance Education System Development, Suranaree University of Technology.

Patamaporn Yenbamrung and Team. (2005). *Development of e-Learning at Sukhothai Thammathirat Open University*, Nonthaburi: Sukhothai Thammathirat Open University.

Sukhothai Thammathirat Open University. (2001). *Distance Education System, STOU Plan 2000. (STOU Plan)*, Nonthaburi: Sukhothai Thammathirat Open University

Wichit Srisa-an and Team. (1986). Philosophy and Development of Distance Education" in *Subject Distance Education*, Nonthaburi: Sukhothai Thammathirat Open University.

Vipa Jaroenpuntaruk and Team. (2006). *Development of e-Learning Lesson for Distance Education*, Nonthaburi: Sukhothai Thammathirat Open University.