

Development of a Sciences Instructional Model with the Use of Interactive Webcast for Sukhothai Thammathirat Open University Students

Associate Professor Porn Sriyamaka, Ed.D.

Office of Educational Technology, STOU, Thailand ◆ TSRIYAMAKA@GMAIL.COM

Associate Professor Pongsit Thaisriharach

Office of Educational Technology, STOU, Thailand ◆ TPONGSIT@YAHOO.COM

Associate Professor Peerawit Jantananon

Office of Educational Technology, STOU, Thailand ◆ PEERAWIT2499@HOTMAIL.COM

Associate Professor Amornmas KhongTham

Office of Educational Technology, STOU, Thailand ◆ KAMORNMAS@YAHOO.COM

ABSTRACT

The purposes of this study were (1) to develop a Science Learning Area Instruction model with the use of interactive webcast for Sukhothai Thammathirat Open University (STOU) students, (2) to compare pre-learning and post-learning achievements of STOU students who learnt from the Science Learning Area Instruction model with the use of interactive webcast, and (3) to study the attitudes of STOU students toward the Science Learning Area Instruction model with the use of interactive webcast.

The researchers developed a Science Instructional model interactive webcast for the 54113 Course: Industrial Hygiene: Evaluation, in three topics namely, (1) Thermal Contact Evaluation, (2) Noise Exposure Evaluation and (3) Light Magnitude Measurement. The sample of this research is a group of 30 students who enrolled in the Hygiene and Safety Major, Public Health Division, School of Health Science, in the first semester of academic year 2008. The data collection routine was (1) provide instruction through interactive webcast, (2) collect learning achievement data before and after the teaching, and (3) collect the samples' opinions through a set of questionnaire designed by the researchers. The data was analyzed using means and standard deviations. The results from the analyses revealed the following findings. (1) The form of the Science Learning Area Instruction model with the use of interactive webcast is the learning through the interactive TV webcast whereby the students can have interactions during the course in 3 ways, namely, the interactions with instructors, with students and with the media in all the steps which include Step 1: Review of Prior

Knowledge, Step 2: Teaching New Knowledge, Step 3: Summarize New Knowledge, Step 4: Skill Practice, Step 5: Implementation of Knowledge, and Step 6: Evaluation. (2)The samples showed a higher degree of learning achievement. The mean of the mark from the pre-learning test was 6.63 whilst that of the mark from the post-learning test was 12.40, with the margin of 5.77, and (3)The samples perceived the Science Learning Area Instruction model with the use of interactive webcast as extremely appropriate.

INTRODUCTION

The Science Learning Area Instruction model with the use of interactive webcast is the application of media and technology through the webcast system which is the integration of several broadcast systems: the production and the broadcast of TV and radio programmes and the internet system, which aims to develop the Science Learning Area Instruction model via the interactive media for distance learning. This model encourages students to learn from actual practices which will generate knowledge from fundamental knowledge and skills in learning (Bhromwongse, 1997), contextualization, and problem-based learning (Laohajarassaeng, 2001). This agrees with the current science teaching trend which has shifted from lecturing to demonstrations, experiments and knowledge pursuance whereby students will practice and glean knowledge by themselves. The Web-based Instruction (WBI) system of Sukhothai Thammathirat Open University will enable students to access the real-time lectures and instructions.

At the same time, the Audio & Video on Demand, Television on Webcasting through the internet system can be another learning choice for students who desire to access the additional learning media of the university.

The implementation of webcast as the educational tool by emphasizing on the interactive implementation is beneficial because it allows students to interact with instructors, professors and other students in an instant manner. Students can express their ideas or post questions on the web-board, in chat rooms, via e-mails and through chatting programmes such as MSN or ICQ. In addition, students can contact the instructor or the professor during a class via telephone or fax. This also, enables the instructor or the professor to contact the student immediately after class. These activities are essential for the self-learning system. Continuous interactions among students, instructors and learning media will increase learning effectiveness and support the development of intellect (Kemp and Smellie, 1989).

As for the science subjects, the university never has any teaching model using the interactive webcast in the form of the Television Interactive Program that as been very successful before. Thus, in this research work, the researchers design a non-confronting teaching medium which emphasises real-time interactions in all the steps of the course. The medium is designed to be an Applicable Interactive Medium; thus, the final outcome is the Interactive Television program (Langdon, 1973; Kemp and Smellie, 1989). This TV program is broadcast through webcast on the website of the university (www.stou.ac.th) where students can access to the live class and perform real-time interactions by choosing the <Media on Demand> link which leads to the webcast page. Then, students click on the <STOU Live 1> link to get access to the class.

This research project will result in the development of a Science Learning Area Instruction model with the use of interactive webcast for the students of STOU, which is more efficient, up-to-date and beneficial for distance learning.

OBJECTIVE

1. To develop a Science Learning Area Instruction model with the use of interactive webcast for Sukhothai Thammathirat Open University (STOU) students;
2. To compare pre-learning and post-learning achievements of STOU students who learnt from the Science Learning Area Instruction model with the use of interactive webcast; and
3. To study the opinions of STOU students toward the Science Learning Area Instruction model with the use of interactive webcast.

RESEARCH FRAMEWORK

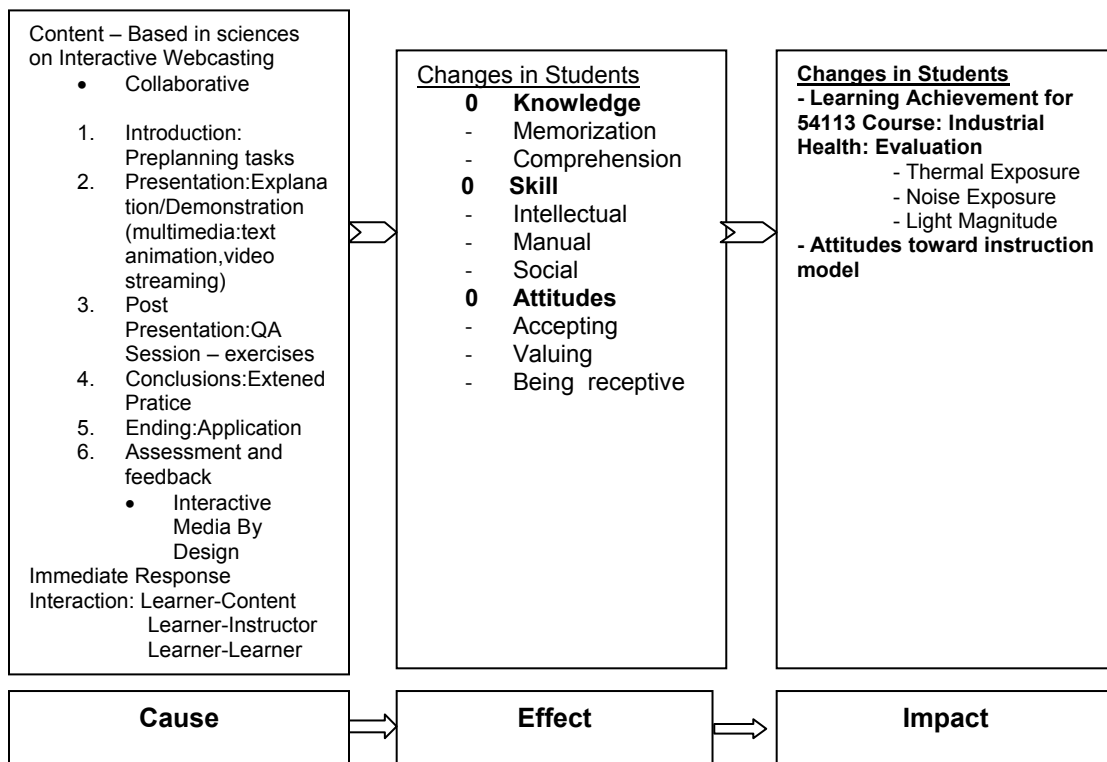
In this research project, the researchers studied other related research papers and theorems in addition to the researchers' ideas and experiences in order to obtain the correlations among the causes, effects and impacts.

Concerning the development of the Science Learning Area Instruction model, it is suggested that an efficient science teaching scheme needs the shift from lecturing scheme to demonstrating, knowledge gleaming and self-practicing (Kuslan and Stone, 1968; Collete, 1973; Laohapaibul, 1999). In addition, several education academics such as Gagne and Briggs (1979) who proposed the 'Learning Principles and Conditions' indicated that whether the learning is effective or not depends on the internal and external learning conditions of students and the learning circumstances which are agreeable to the Information-Processing Model whereby students are rewarded immediate feedback. There are 9 teaching routines that can be regarded as favourable for a student's internal learning conditions, namely, 1) the subject is of interest to the students, 2) the students are informed of the learning objectives, 3) the students are encouraged and persuaded to recall their old knowledge, 4) the course topic is provided, 5) the learning routine is suggested, 6) the students are encouraged to practice, 7) the instructors gives feedback to students, 8) the students' performances are evaluated, and 9) the instructors emphasizes on the knowledge and disseminate it to students (Knirk and Gustafson, 1986). In this research project, the researchers hold a hypothetical class which emphasizes on teaching theories before the practice (Chaowakiratiphongse, 2001) and uses webcast technology.

The developed instruction model will be applied to the teaching of the 54113 Course: Industrial Hygiene : Evaluation, in three areas, namely, 1. Thermal Contact Evaluation, 2. Noise Exposure Evaluation and 3. Light Magnitude Measurement. The interactive learning can develop students' knowledge and interest in the subject in certain degrees (Hoksuwan, 1997). In addition, the interactions among students, instructors and media will increase the levels of learning effectiveness and intellect (Kemp and Smellie, 1989) and webcast technology can develop these interactions (Malithong, 2005; Suebsanoh et

al, 2009). Therefore, the researchers will apply the interactive teaching approach (Bhromwongse, 1997) and the principle of the interactive TV program design (Langdon, 1973; Sorensen, 1994).

CONCEPTUAL FRAMEWORK



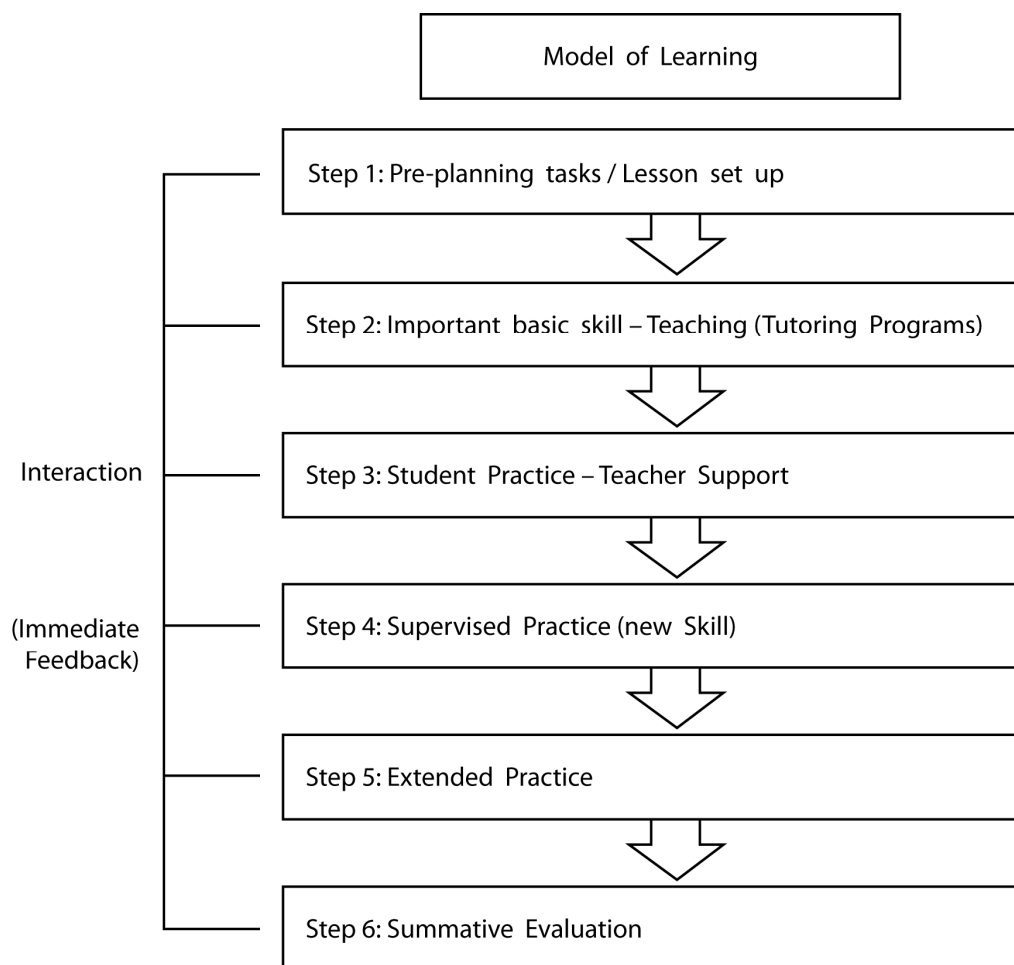
RESEARCH METHODOLOGY

Carrying out this research project, the researchers collect the desired data and information from 30 samples who are students of the Health Science Bachelor (Continuous) Course, Hygiene and Safety Major, School of Health Science. All of the 30 samples registered for the 54113 Industrial Health: Evaluation course for the first time in the first semester of academic year 2008. The tools used in this research were 1) the Science Learning Area Instruction model with the use of interactive webcast for the 54113 Course: Industrial Hygiene : Evaluation, in three topics , namely, Thermal Contact Evaluation, Noise Exposure Evaluation and Light Magnitude Measurement, which is an interactive TV program emphasizing on immediate interaction, each of which lasts 1 hour and broadcast through the webcasting system of STOU; 2) the Pre-Learning and Post-Learning Form of Learning Achievement Evaluation to evaluate the studied samples knowledge, comprehension, implementation and skills in scientific processes, which is a set of test consisting of 20 questions each of which provides 4 multiple choices; and 3) a set of questionnaire to evaluate the samples' opinions toward

the instructional model, the data and information collected which will be analysed for percentages, means and standard deviations.

RESEARCH PROCEDURE

The researchers develop a Science Learning Area Instruction model with the use of interactive webcast, which is a live interactive TV program that broadcasts the classroom teaching via webcasting system on the www.stou.ac.th website. The TV program emphasises the 3 forms of interactions, namely, interactions between the instructor and the students, interactions among the students and the interactions between the students and learning media in all the following steps of the learning.



The preparation step: This step emphasizes on the review of the fundamental knowledge and the pre-learning test before leading the students to the live classroom online.

Step 1: The instructor will provide students the introductory information, the outline of the subject, the objectives of the subject and multimedia tools and instruments. In this step, students will be encouraged to answer questions asked by the instructor, interact with the instructor, and exchange their ideas with each other via e-mails or instant chatting tools.

Step 2: The instructor will provide explanations and demonstrations on the subject. The instructor will teach and ask questions whilst students can share their ideas, ask questions and respond to the instructor anytime.

Step 3: This step is the summary phase emphasizing the interactions between the instructor and the students where the instructor will review the subject discussed afore. The whole class will then work together so as to summarize the subject. The instructor will ask hypothetical questions so as to enable the students to apply the knowledge in different situations.

Step 4: This step is the practice step where the results from the learning of each student will be measured through practical activities for the students. Each student can share his/her ideas with others. Later, the instructor will suggest the solutions for each problem to finalize the results. This step is emphatic on immediate interactions.

Step 5: In this implementation step, the instructor will give some actual cases that require students to solve the problems by themselves. Students are encouraged to exchange ideas with each other.

Step 6: This step is the evaluation step. The instructor will summarize the main ideas of the subject and answer all the questions before letting the students do the post-learning test and filling the answers to the questionnaire that measure their opinions toward the instruction model.

RESEARCH RESULTS

The results from the research reveal that the scholars in the contents, the educational technology, and the educational evaluation think that the instructional model is appropriate in all the respects, namely, the content and the process, the images, the language, the sound, the design and the presentation. The IOCs is 0.66-1, which shows that the IOC of each item is more than 0.5.

Concerning the comparison between the results from the pre- test and those of the post-test, the mean from the pre-learning test was 6.63 with a standard deviation of 2.68 whilst the mean of the post-learning test was 12.40 with a standard deviation of 2.80. This demonstrates that the students secured higher marks after the class, with an average margin of 5.77.

Concerning students' attitudes toward the instruction model, the students were highly satisfied with all aspects of the model, i.e., the contents, the presentation, the

interactions and the evaluation. The total mean was 4.06. Considering each aspect separately, 63.3% of students highly agree that the instructions in the form of the TV programme through webcast allowed them to obtain more knowledge. In addition, 50% of students highly agree that the learning objectives were clear, the contents were agreeable to the objectives and the format of the TV programme allowed them to easily understand the subject. At the same time, 60% of the students highly agree that there were activities to evaluate their knowledge and comprehension in an appropriate time interval. However, 36.7% of the students moderately agree that they were allowed to interact with each other during the class.

The scholars who evaluated the interactive TV programme through webcast that teaches the three topics of the course, i.e., 1) thermal exposure evaluation, 2) noise exposure evaluation and 3) light magnitude measurement think that the programme is appropriate in all aspects.

Concerning the contents and the process, the scholars think that the contents are in accord with the learning objectives, the presentations are in the appropriate order, the contents were accurate, the presentation was interesting, the multimedia presentation was appropriate for the contents of each subject, the language used for giving the instruction was comprehensible and clear, the explanations and demonstrations, as well as the activities held during the class, make the students become enthusiastic and enable them to have direct experiences, and the summary session was appropriate.

Concerning the images, language and sound, the scholars think that the images were agreeable to the contents, the description sound was clear and the images and sound were agreeable to each other.

Concerning the design of the instruction model and the presentation, the font, sizes and colours of the text are precise and stimulating. This enabled the students to clearly understand the contents and interact with both the instructor and the learning media.

Concerning the interactive activities, the scholars suggest that the important factors that make the instruction model favourable are the clear instructions, the appropriateness of the activities and the interactive phrases where students were allowed to share their ideas, as well as the provision of feedback.

Designing the instructional model, the researchers proceeded in the four stages, 1) the stage of planning and preparation, 2) the stage of study, analysis, synthesis, and formation of the instruction model, 3) the stage of prototype test and data analyzes, and 4) the stage of development, test, and re-design so as to create the instruction model that fits the actual circumstances. This operation is according to the teaching template (Bhromwongse, 2003) and concentrates on the characteristics and requirements of the students of distance learning programmes suggested by Carlson et al (1998). The teaching and learning through websites is the apparent example of the integration of technology and teaching model design which brings education to those who have never had chances to study before, dissolving the obstacles of space and time. The webcast technology, which is the tool studied in this research project, enables instructors to convey online texts, images, motion pictures, and sound to students who can study from any place and at anytime. In addition, the technology also enabled students to instantly interact with instructors and other students. Thus, this is the teaching model through the interactive websites (Hannum, 1998).

As a result, students of STOU will change their roles from knowledge receivers to knowledge explorers, thinkers and practitioners in the collaborative and interactive learning system which allows students in distant areas to learn by themselves in an effective manner.

CONCLUSION

The participants in this research study were highly satisfied with the instructional model. Most of the students suggested that this model should be applied to as many courses as possible.

In addition, they were satisfied with the contents and the effectiveness of the interactions between them and the instructor, and their interactions with the media in the forms of texts, images and sound. When students propose their answers to questions, the learning media can give immediate feedback, which is the Real-Time Interaction that agrees to the Interactive Instructional design proposed by Langdon (1973), which enable students to obtain knowledge, develop skills and have more positive attitudes toward science subjects.

Furthermore, in addition to real-time classes, the university can also use this instructional model to provide the rerun classes to students who desire to learn.

This interactive programme can create the collaborative learning which enables the learning objectives to be accomplished; thus, it can be applied to the learning at all levels: Bachelor, Master and Doctoral degree levels.

The live broadcast through webcasting is applicable to all types of presentations such as lectures, demonstrations, interviews or online discussions. Thus, not only is it beneficial for the teaching but it is also beneficial for the educational servicing of the university as well.

REFERENCES

Bhromwongse, Chaiyong (1997). "Educational System Management in School" in *Educational Management Document Unit 7*, Page 27. Nonthaburi: Sukhothai Thammathirat Open University, School of Educational Studies.

_____. (2546). *The Creation of Electronics Learning Instruments*. Bangkok: Aimphan.

Chaowakiratiphong, Nuanjit (2001). "Teaching in Vocational Level" in *Management of Teaching in Vocational Level Document Unit 4*, Pages 208-211. Nonthaburi: Sukhothai Thammathirat Open University, School of Educational Studies.

Collete, Afred T. (1973). *Science Teaching in the Secondary School*. Boston: Aeeyn and Bacon.

- Gagne, R. M. and Briggs, L. J. (1979). *Principles of Instructional Design*. New York: Holt, Rinehart and Winston.
- Hoksuwan, P (1997). "Development of Additional Teaching by Using Interactive Radio and Television Programmes for Distance Learning of Sukhothai Thammathirat Open University". Doctoral Thesis in Educational Technology Department, Srinakarinwirot University.
- Kemp, J. E. and Smellie, D. C. (1989). *Planning, Producing and Using Instructional Media*. New York: Harper and Row
- Knirk, Frederick G. and Gustafson, Kent L. (1986). *Instructional Technology, A Systematic Approach to Education*. New York: Holt, Rinehart and Winston
- Kuslan, Louis I., and A Harris Stone. (1968). *Teaching Children Science: and Inquiry Approach* Belmont, California: Wadsworth Publishing Company
- Langdon, G. (1973). *Interactive Instructional Design*. New Jersey: Education Technology Publishing
- Laohajarassaeng, Thanomporn (2001). <http://www.edtechno.com.th>, Retrieved on 11th June, 2009
- Laohaphaibul, Phop (1999). *The Way to Teach Sciences*. Bangkok: Thaiwattanapanich
- Malithong, Kidanan (2000). *Educational Technology and Innovation* (2nd ed.). Bangkok: Chulalongkorn University.
- Suebsanoh, Pornthip, et al (2009) *The Study on the Application of Webcast Technology to Thailand's Mass Media Activities*
http://wiki.nectec.or.th/ru/IT630_1_2008Students/
[Webcast#](http://wiki.nectec.or.th/ru/IT630_1_2008Students/) วิจัยนภาการของเทคโนโลยี20%Webcastin, Retrieved on 28th May, 2009
- Sorensen, Christine Knupp. (1994). Evaluation of Two-Way Interactive Television for community College Instruction: Development of and Instrument and Assessment of student Attitudes