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K_K0008: THE APPLICATION OF AUGMENTED REALITY IN MAKING MUTIMEDIA AND EDUCATIONAL ACTIVITIES ABOUT REPRODUCTIVE SYSTEM FOR THE 8th GRADERS

Jumrus Klinhnu*
Chiangrai Rajabhat University, Paholyothin Road, Muang, Chiang Rai 57100, Thailand
*e-mail: k_jumrus@hotmail.com

Abstract: In this course of educational semi-experimental research, the researcher had purposes to try to apply the Augmented Reality with education, and to create the instructional multimedia and activities concerning the reproductive system for 8th graders. Augmented Reality is the visualization blended with Image technology in order to form the 3D visual environment closest to reality. The sample groups of this study were 3 groups of 8th graders from Chiangrai municipality school 6th. The sample groups were selected by the methodology of simple random sampling and were randomly put into an experimental group, a control group, and an instrumental evaluating group. The total was 109 people. The instruments of research consisted of course achievement evaluation forms which had the reliability rate between 0.5-0.75, the satisfaction evaluation forms toward the multimedia which had the index of item-objective congruence between 0.67-1.00, and the quality evaluation forms of multimedia which had the index of item-objective congruence between 0.6-1.00. The results are as follows:

1. The E1/E2 potential of reproductive system multimedia equaled to 84.2/86.7 which was higher than the 80/80 standard.
2. Students studying the reproductive multimedia scored 0.01 higher in statistical significance in pre-tests than post-test.
3. The reproductive multimedia learners over-all were very satisfied with the lesson. The most satisfied criteria on the questionnaires were that studying via multimedia was easier, more exciting, and more fun than other kinds of instruction. Moreover, learners had more freedom to learn, think, and decide when it comes to studying via instructional multimedia.
4. The achievement of students attending the traditional classroom and of those studying via multimedia was 0.05 different in the statistical significance. The average of students using the multimedia was higher than those attending the lecturing methodology.

Introduction: According to the educational statistic of the science subject about the reproductive system for the 8th graders in the previous 3 educational years, it was found that students achieved very low scores from the reproductive system examinations. The 2 causes of this incidence was the teaching methodology that instructors principally narrated in classes which resulted in lacking of motivation and attention among students. And the second reason to the failing was the content of the lesson being about reproductive system thus it resulted in embarrassment and miscommunication between the adolescent learners and their teachers. This brought about low accomplishment of learners in this particular chapter and would also continue to demolish the final score achievement.

The instructors had tried to come up with many solutions to draw the attention from learners including adjusting the way of teaching to use more of multimedia, instructional programs, exercises, and the instant lessons to help with reviewing. Although this had resulted in higher grades at some level, but it did not meet the satisfaction of the instructors. Nowadays, various technologies have been introduced into making educational multimedia especially the Augmented Reality: AR which has the ability to make a visual learning environment in 3D and 4D systems. This function can easily motivate learners and encourage them to further their ideas faster. Students will have good experience in linking the information perceived to

places or objects which were specifically created to suit the lessons by teachers in 3D and 4D systems. Appending this to the phone camera technology learning or cameras on other portable devices would contribute to more of out-door class and activities. Researchers have realized the potential of AR, thus the instructor would like to apply this technology to the making of Multimedia and educational activities in the subject of Science about the reproductive system.

Objectives:

1. To create multimedia and educational activities about reproductive system for the 8th graders
2. To study the educational achievement of the 8th graders who have studied multimedia on the subject of Science about the reproductive system.
3. To study the attitudes of the 8th graders toward multimedia on the subject of Science about the reproductive system

Methodology: In this course of educational semi-experimental research and the step are as follows

1. Populations that were used in this research are the 8th graders which were categorized into 3 sample groups. One of the samples would be used as study group, another group would be classified as control group, and the last specimen would be the experimental group. Altogether, there were 109 people.
2. The Variables Used in This Study

2.1 Independent variable was teaching methodology

2.2 Dependent variable was the potential of Multimedia, achievement and attitude of learners.

3. Research Style used in the student's achievement on the reproductive system study was the experimental research style. It was done on only one group of population. Moreover, there were pre-test and post-test and the procedures are as follow.

O_1	X	O_2

O_1 refers to the basic answers to questions before initiate the instruction by using ready-made lessons

X refers to the methodology of teaching by using Multimedia along with reactions that harmonize with theories.

O_2 refers to post-test.

4. Instruments Used in the Study

The details of creating and evaluating this research are as follow.

4.1 Research Questionnaires: The researchers studied the creation of questionnaires relevant documents and researches then analyzed the contents that they wanted to develop. They then picked the tools they would use to evaluate and define the evaluating criteria. The questionnaire type used in this study was Likert Scale style which has 5 alternatives. It passed the inspection of experts with the index of objective congruence more than 0.78 point. There were some questions that researchers had adjusted to suit the objectives following the advice of experts. The questionnaires were later practically used to collect information in order to define the alpha coefficient of Cronbach. The alpha coefficient was at 0.63. Then the questionnaires were printed to be used in the next research.

4.2 Examinations: The examinations used in the subject of Science were the instrument applied in evaluating the achievement of learners. The procedures of creating the examinations are as follow.

1) Researchers studied steps of making examinations of Science subject from documents, Theories, related researches, and the documents accompanied with lessons.

2) Create the content analyzing tables and define the behavioral objectives to use as a guideline of making Science examinations. There were 5 choices as shown in the content analyzing tables. Confront the Science and educational evaluation experts to check the correctness of the content. Single out only examinations consisted of 0.5 Index of Objective Congruence to be printed and practically used.
3) Take the results of analysis to calculate the difficulty and define individual discrimination of each question. Pick out solely the questions that have difficulty and discrimination value between 0.2-0.8 then calculate the reliability of the whole examination. The reliability of the examination was at 0.73 point. The examinations were later on readjusted before being printed and used in the study.
Multimedia was created by these following procedures.
1) Content analysis was done by discussing descriptions of individual subject. The research also analyzed levels of learners' behavior by considering from the main topic. Write behavioral objectives and define the amount of questions. Use the level of behavior obtained from experts as the framework before letting the experts have a look at the content.
2) Designing Multimedia by writing scope of study. The structure of content and lessons consisted of Topic: T which has subtopic called Item: I. Define the learning process of students from the scope of study which would represent the whole content that learners had to study. The style of learning for each student was different by which the students needed to study required topics orderly as defined in scope of study. Type of initial knowledge could be codified from pre-test of each learner by considering from scores achieved. Researchers later on saved the previous information as the students' type of initial knowledge to make learners learn topics orderly as defined in scope of study. The contents of each subtopic were arranged in the way of mixed multimedia which was presented in 3 styles regarding lecture style, lecture style with examples, and summing up of the instructional activity style.
3) Developing the Multimedia. Researchers started with making the multiple choice examination following the behavioral objectives. They then checked the accuracy and coherence of the content based on the objectives.
4) Creating Multimedia. Animations were created from Adobe Flash. 3D and 4D multimedia were made from 3DsMax. The visual instructional activities were done using Augmented Reality. Researchers used Build AR Pro to create the work from the layout designed earlier. They then checked and readjusted the Multimedia and calculated the potential of that Multimedia by the rule of 80/80 from the total of 52 students. The result came out achieved the rule of 80/80 which meant that this Multimedia potential was good.
5) Quality of Multimedia was checked by technical experts.
6) The study reappraisal was done by readjusting and improving the Multimedia based on the experts' advices.
7) Researchers had done all these following steps in order to examine the multimedia.

5. Control Group Pretest – Posttest Design

Table 1. Experimental plans of control group.

Group	Pre-test	Experiment	Post-test
R_E	T_1	X	T_2
R_C	T_1	~X	T_2

When T1 represents Pre-test; T_2 represents Post-test
R_E represents Experiment Group; R_C represents Control Group
X represents Teaching via Multimedia; ~X represents Teaching in regular class
R represents Random assignment

5.1 During the making process of Multimedia, the researchers had tried to use Multimedia. The first trial was done on 5 students in one to one testing system. These students were assigned to study Multimedia, and they were required to do pre-test and post-test. The researchers then ask the sample group about the obstructions of learning with Multimedia therefore, they could later practically apply it to the small group testing with 10 people. The procedures were similar to the first step which learners were assigned to do pre-test and post-test. The researchers later on did the field testing with 36 selected students. The procedures again were similar to the second step which required the sample group to do pre-test and post-test in order to analyze and evaluate the result based on the rule of 80/80.

5.2 Before doing the experiment, the researchers had collected the pre-test result from the sample group.

5.3 While experimenting, the sample group was assigned to study Science multimedia by giving learners freedom to do activities. They were required to attend the debates which contained details as follow.

1) Learners should study the behavioral objectives.
2) Learners should do pre -test before studying Multimedia.
3) Learners should study Multimedia and participate in the interaction between learners and lessons.
4) Learners should do exercises.
5) Learners should research from internet.
6) Learners should conclude the result of research, then present and debate together.
7) Researchers collect quality information to evaluate the behavior of learners both before and after study with electronic lessons in order to find out the development and progress after learning with Multimedia.
8) Researchers evaluate the educational achievement from post-test.

6. Collecting Information: Researchers used multimedia about the reproductive system of science subject which were previously used with the 8th graders with the target group of the 3rd semester, 2012. The researchers then collected the pre-test and post-test result together with attitude of learners toward multimedia.

7. The Information Process and Information Analysis
Researchers analyzed and compared collected information by calculating educational statistic with the ready-made program called SPSS which contains details as follow.

7.1 Evaluate the achievement of a group of population by finding mean and defining the standard deviation.

7.2 Analyze quality of examination by finding difficulty rate and discrimination along with reliability and validity.

7.3 Define the validity of examination by finding face validity or index of objective congruence.

7.4 Analyze the questionnaires evaluating attitude of learners toward the ready-made lesson by finding mean and standard deviation.

Discussion:

1. The reproductive system multimedia had the E1/E2 potential equaled to 84.2/86.7 which was higher than the 80/80 standard. This was because the instructors emphasized on the interaction activities between lessons and learners. Thus learners would pay attention to the design of stimulations, activities, and content. Learners could view the content on the screen in 3D and 4D systems and participate in the content of all time which would contribute to knowledge and apprehension of learners. Moreover, they can memorize better than learning with lecture style. Besides, there were also questions, exercises, and audio to bring best reaction and participation out of learners. According to Tanormporn Loahacharussang's research (2012: p125), it was written that multimedia had been a good method of learning which was planned, designed, and checked by the experts from different fields regarding technical field, making field, and designing field. Thereby it can truly help learners to learn by themselves with joy. The same way with the research of Suphasomboon Engruttanakorn (2011: p87), it was found that learners had had good attitude toward multimedia.

2. Students studying the reproductive multimedia scored 0.01 differently in statistical significance in pre-tests and post-tests. The post-test average scores were higher than the pre-test. This showed the huge academic improvement thanks to the multimedia which was developed based on the 9 Basic Teaching Steps of Gagne. This perhaps resulted from the potential of technologies used to make lessons more interesting such as images, animations, audio, and texts. It harmonized with the research of Somchit Srisomkhuan (2010: p98) and the study of Sunti Wijackanayuk (2011: p120). They were found that after having been using mathematic multimedia, learners had highly progressed by achieving 0.05 more on post-test scores than the pre-test score averagely. Furthermore, the research of Thati Hungoa (2010: p82) also found that using multimedia on the ninth graders could greatly improve their academic achievement.

3. The reproductive multimedia learners over-all were very satisfied with the lesson. The most satisfied criteria on the questionnaires were studying via multimedia was easier, more exciting, and more fun than other kinds of instruction. Moreover, learners had more freedom to learn, think, and decide when they study via instructional multimedia. It was coordinated with the research of Jonassen and Hannum (2010 : p14), Sininart Triengpon (**2012:** p136), and Sudrudee Khunthamoon (**2011**: p75) They found that stimulations or content helped in affecting well understanding and memorization included description, exercises, marker and audio to draw the attention. This theory also went along with Tanormporn Loahacharussang's research (2012:p125), which said that electronic learning was certified and speculated by experts. It also was produced by the technical, designing, content experts. Therefore it could help learners to master their skills with joy. Moreover, it harmonized with the research of Suphasomboon Engruttanakorn (2011: p104) which found that student had good opinions toward multimedia. The same way with Suraphon Weannon (**2010**: p92) It was found that students thought that multimedia was interesting, challenging, and having good interaction between learners and multimedia.

4. The results of the comparison between learning achievement multimedia appeared no significant difference. This means that the learning on multimedia reaches the desired quality and efficiency level equally or more than that of the traditional classroom. The reasons to support this claim are that: the instruction through the multimedia is the innovative style which the learners have never experienced before. It is the lessons taught through the computer which can change the learners' experience from the traditional classroom atmosphere where the teacher controls the teaching to independent learning. The learners use computer as tool learning the content from the program in which they have to learn independently by following the instructions described in the program. The lessons provide various multimedia which can motivate the learners' interest since they contain the

description with examples, exercises, and tests. With these, the learners' learning achievement became higher. Moreover, Phisutha Areerat (2005: p127) and Rewat Khupta (2004: p196) researched on this feature and found that the students who learned through multimedia had higher learning achievement and positive attitude toward learning similarly to those who learned through lectures.

Conclusion: The results are as follows

1. The reproductive system multimedia had the E1/E2 potential equaled to 84.2/86.7 which was higher than the 80/80 standard.
2. Students studying the reproductive system multimedia scored 0.01 differently in statistical significance in pre-tests and post-tests. The post-test average scores were higher than the pre-test.
3. The reproductive system multimedia learners over-all were very satisfied with the lesson. The most satisfied criteria on the questionnaires were studying via multimedia was easier, more exciting, and more fun than other kinds of instruction. Moreover, learners had more freedom to learn, think, and decide when they study via instructional multimedia.
4. The achievement of students attending the traditional classroom and of those studying via multimedia was 0.05 different in the statistical significance. The average of students using the multimedia was higher than those attending the lecturing methodology.

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