The Development of Computer Multimedia Edutainment Instructional Package Entitled “Introduction to Statistics”

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ABSTRACT

The purposes of the research were to develop a computer multimedia edutainment instructional package entitled “Introduction to Statistics”, to find out the efficiency of the package, the learning achievement, and learners’ satisfaction towards the package. The research tools were as follows: 1) the computer multimedia edutainment instructional package entitled “Introduction to Statistics”, 2) quality evaluation form, 3) achievement tests on the learning achievement, and 4) questionnaire on learners’ satisfaction. The research sampling group consisted of 40 bachelor’s degree students, in the field of Information Technology, Faculty of Information Technology, King Mongkut’s University of Technology Thonburi. The results revealed that the efficiency of the computer multimedia edutainment instructional package was at 82.30 / 82.33, which was higher than the criteria of 80/80. As for the effectiveness evaluated by experts in content towards the computer multimedia edutainment instructional package, it was 4.19 on the average, or at a good level, in other words. The effectiveness evaluated by experts in multimedia was 4.16 on the average, or at a good level. When the pre-test and post-test scores were analyzed to find out the learning achievement, it was found that the post-test scores were obviously higher than the pre-test scores at a significant level of 0.01. The satisfaction of learners towards the computer multimedia edutainment instructional package was 3.99 on the average, or at a good level.

Keywords: Computer Multimedia Instructional Package/Edutainment/Introduction to Statistics

BACKGROUND AND RATIONALE

Education in every field needs to apply statistics because statistics is related to effective decision and quality improvement. All of this is based on the correctness of the data in order to analyze and find out solutions to make summary. At present, statistics is still taught in form of lecture in that instructors give and explain the contents or the stories to listeners [1] which might take long or short time. The instructors are the main person who has roles in class. The learners come to receive the contents prepared by the lecturers. This approach is called one-way communication. Moreover, the learners practice and do exercises in books or learning materials prepared by the lecturers only. In order to gain the most effective instruction, each learner must pay attention and receive as well as review all learning materials with all contents.

However, it was found that in statistics classroom, many learners cannot gain full knowledge because the learners have little attention and little endurance to listen for a long time. Basic statistics is known to be a complicated subject. Learners do not want to learn, know and many learners fail, thus. Suchat Prasitrattasin [2] says that many instructors do not use daily situations which are related to numbers in their classroom and their instruction. Many instructors try to force their
learners to remember many formulae and symbols. Therefore, the learners get confused with all the formulae and symbols and many of them are not in the mood for better comprehension. Statistical techniques are mainly taught so that all learners learn by heart instead of being able to apply in real life. This might be due the fact that such instruction method is easy to measure the learning achievement of learners. Unfortunately, many learners neither understand statistics nor know how to apply their knowledge in higher research or instruction.

Priroj Teeranatanakul [3] says that computer can be used to increase the effectiveness of the instruction and help learners learn and develop themselves. Computer multimedia instructional package can be used along with the lesson the instructors teach. In some cases, computer multimedia instructional package can substitute the instructors in that it presents the lessons and the contents instead of the instructors. The learners learn the contents and the lessons with still images, animation, narration, music, sound effect. Learners can do pre-test and post-test and practice skills through computer. They can learn anywhere and anytime. Therefore, computer multimedia instructional package can help all learners learn and develop themselves and help them evaluate, review as well as practice. Basic statistics is a difficult subject, resulting in poor attention from students. The learners also get bored and bad attitude towards basic statistics. Therefore, appropriate learning material will help learners learn and understand the contents more easily. Self-study is also important thing. Since computer multimedia instructional package is intended for individual use, the development is designed in the way that the learners can learn by themselves according to their knowledge and ability without boredom. The most important thing is that the learners should complete all learning objectives. The development of computer multimedia instructional package must be flexible so that each learner can learn with their own pace-fast or slow-according to their ability. This way, all learners can achieve all learning objectives. The researchers, therefore, decided to develop computer multimedia edutainment instructional package entitled “Introduction to Statistics”. This computer multimedia edutainment instructional package contains both contents and entertainment along with images, animations and sounds. Cartoon animation contains both narration and music. Learners can think, absorb and learn without boredom. This way, learners will understand basic statistics better, resulting in learners’ learning effectiveness and their application in higher education.

**RESEARCH OBJECTIVE**

1. To develop computer multimedia edutainment instructional package entitled “Introduction to Statistics”
2. To find out the efficiency of the developed computer multimedia edutainment instructional package entitled “Introduction to Statistics”
3. To find out the learning achievement of the developed computer multimedia edutainment instructional package entitled “Introduction to Statistics”
4. To find out learners’ satisfaction towards the developed computer multimedia edutainment instructional package entitled “Introduction to Statistics”

**RESEARCH HYPOTHESES**

1. The efficiency of the computer multimedia edutainment instructional package entitled “Introduction to Statistics” meets the specified criteria of 80/80.
2. After studying the computer multimedia edutainment instructional package entitled “Introduction to Statistics”, the learners show more learning achievement with statistically significant level at the 0.01 level.
3. After studying the computer multimedia edutainment instructional package entitled “Introduction to Statistics”, the learners show high satisfaction towards the developed package.

**EXPECTED OUTCOMES**

1. The computer multimedia edutainment instructional package entitled “Introduction to Statistics” was efficient enough after it was tested in terms of efficiency and learning
achievement. This package can be used as remedial for learners who attend “Introduction to Statistics” class.

2. Learners could self-study. All learners know their responsibilities because they could review the lessons anytime when they are ready.

3. Entertainment is gained along with the contents of the efficient computer multimedia edutainment instructional package entitled “Introduction to Statistics”.

4. There will be another approach for instructors and programmers in developing computer multimedia edutainment instructional package for other subjects or related fields.

**RESEARCH SCOPE**

The development of the computer multimedia edutainment instructional package entitled “Introduction to Statistics” contained 3 contents as follows: 1) Descriptive statistics, 2) Inferential statistics, and 3) Statistics test.

**POPULATION AND SAMPLING GROUP**

The population for this study consisted of 60 first year students from the Department of Information Technology, Faculty of Information Technology, King Mongkut’s University of Technology Thonburi who attended “Introduction to Statistics” course.

The sampling group for this study was chosen by purposive sampling technique. There were 40 first year students from the Department of Information Technology, Faculty of Information Technology, King Mongkut’s University of Technology Thonburi who attended “Introduction to Statistics” course in order to find out the efficiency, the learning achievement of the developed computer multimedia edutainment instructional package entitled “Introduction to Statistics” and learners’ satisfaction towards the developed package.

**RESEARCH METHODOLOGY**

The development of the computer multimedia edutainment instructional package entitled “Introduction to Statistics was done using the following research methodology.

**RESEARCH TOOLS**

The research tools used to develop the computer multimedia edutainment instructional package entitled “Introduction to Statistics” consisted of 1) the computer multimedia edutainment instructional package entitled “Introduction to Statistics”, 2) efficiency and learning achievement test, 3) quality evaluation form for the contents and multimedia of the lessons, and 4) questionnaire on learners’ satisfaction towards the computer multimedia edutainment instructional package entitled “Introduction to Statistics”.

The development of the computer multimedia edutainment instructional package entitled “Introduction to Statistics” follows the approach in developing computer instruction packaged called IMMCIP (Interactive Multimedia Computer Instruction Package) developed by Priroj Teeranatanakul and Paiboon Kiattikomol. There are 5 major steps which can be divided into 16 sub-steps as follows:

![Figure 1: Diagram showing the steps in developing computer multimedia instruction package](image-url)
Test for Find out the Efficiency and Learning Achievement of the Package and Learners’ Satisfaction towards the Package

The researchers did the test to find out the efficiency and learning achievement of the computer multimedia edutainment instructional package entitled “Introduction to Statistics” and learners’ satisfaction towards the package in the second semester of the academic year 2007. The test was done with the sampling group of 40 first year bachelor’s degree students from the Department of Information Technology, Faculty of Information Technology, King Mongkut’s University of Technology Thonburi. Here are the details:

(1) The document was sent to the lecturers to allow the test with the sampling group. The document described the details and the objectives along with other information about the experiment.

(2) The computer multimedia edutainment instructional package entitled “Introduction to Statistics” was tested with the sampling group. The researchers explained how to use the program with the sampling group. The sampling group did pre-test and learned the computer multimedia edutainment instructional package entitled “Introduction to Statistics” lesson by lesson, and then they did exercises for all 3 lesson units.

(3) After completing all lesson units, the sampling group did post-test and the researchers asked them to fill out the questionnaire on their satisfaction towards the computer multimedia edutainment instructional package entitled “Introduction to Statistics” and reported the analysis based on statistical data.

RESEARCH RESULTS

(1) This research was aimed to develop a computer multimedia edutainment instructional package entitled “Introduction to Statistics”, to find out the efficiency of the package, the learning achievement, and learners’ satisfaction towards the package. The researchers did research according to the following procedure.

(2) The computer multimedia edutainment instructional package entitled “Introduction to Statistics” was developed with efficiency. The quality of the lesson contents and the multimedia which was evaluated by the experts yielded the average scores of 4.19 and 4.16, respectively. That is to say, the instructional package was efficient enough to be used in real “Introduction to Statistics” course. The data were presented in Tables 1-2.

Table 1
Summary of Quality Evaluation from Experts in Contents

<table>
<thead>
<tr>
<th>Items to be Evaluated</th>
<th>( \bar{X} )</th>
<th>S.D.</th>
<th>Quality Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contents</td>
<td>4.13</td>
<td>0.58</td>
<td>Good</td>
</tr>
<tr>
<td>2. Graphics and Sounds</td>
<td>4.17</td>
<td>0.68</td>
<td>Good</td>
</tr>
<tr>
<td>3. Exercises</td>
<td>4.28</td>
<td>0.58</td>
<td>Good</td>
</tr>
<tr>
<td>Average</td>
<td>4.19</td>
<td>0.61</td>
<td>Good</td>
</tr>
</tbody>
</table>

Table 2
Summary of Quality Evaluation from Experts in Multimedia

<table>
<thead>
<tr>
<th>Items to be Evaluated</th>
<th>( \bar{X} )</th>
<th>S.D.</th>
<th>Quality Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Texts and Colors</td>
<td>4.00</td>
<td>0.23</td>
<td>Good</td>
</tr>
<tr>
<td>2. Still Images</td>
<td>4.20</td>
<td>0.35</td>
<td>Good</td>
</tr>
<tr>
<td>3. Sounds</td>
<td>4.20</td>
<td>0.46</td>
<td>Good</td>
</tr>
<tr>
<td>4. Interactions</td>
<td>3.93</td>
<td>0.35</td>
<td>Good</td>
</tr>
<tr>
<td>5. Other Features such as Display Design, Response with Contents and Learning Result Report</td>
<td>4.47</td>
<td>0.66</td>
<td>Good</td>
</tr>
<tr>
<td>Average</td>
<td>4.16</td>
<td>0.41</td>
<td>Good</td>
</tr>
</tbody>
</table>

(3) The efficiency of the computer multimedia edutainment instructional package entitled “Introduction to Statistics” in terms of \( E_1/E_2 \) was 82.30 /82.33, which was higher than the criteria of 80/80 as shown in Tables 3-4.

Table 3
Scores while learning and the efficiency of the instructional package per lesson unit.

<table>
<thead>
<tr>
<th>Lesson Unit</th>
<th>Scores while Learning</th>
<th>The efficiency of the lesson while using the</th>
</tr>
</thead>
</table>


Table 4
package entitled “Introduction to Statistics”
Scores after using the instructional package to find out the efficiency of the computer multimedia edutainment instructional

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Learners</th>
<th>Total Scores</th>
<th>Raw Scores from All</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>The efficiency of the instructional package after learning (E2)</td>
<td>40</td>
<td>30</td>
<td>988</td>
<td>82.33</td>
</tr>
</tbody>
</table>

(4) The learning achievement of the learners after using the computer multimedia edutainment instructional package entitled “Introduction to Statistics” revealed that the learners showed higher average scores of the post-test when compared to average scores of pre-test at significant level of 0.01. The efficiency of the instructional package after learning was compared with the efficiency of the instructional package while learning and showed the difference of 62.17. That means the computer multimedia edutainment instructional package entitled “Introduction to Statistics” could increase the learning achievement by 62.17 as shown in Tables 5-6.

Table 5
The learning achievement of the learners who used the computer multimedia edutainment instructional package entitled “Introduction to Statistics”

<table>
<thead>
<tr>
<th>Tests and Results</th>
<th>n</th>
<th></th>
<th>S.D.</th>
<th>t</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>30</td>
<td>6.05</td>
<td>1.50</td>
<td>40.36**</td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>30</td>
<td>24.70</td>
<td>2.57</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6
The increase in learning achievement of the learners who used the computer multimedia edutainment instructional package entitled “Introduction to Statistics”

<table>
<thead>
<tr>
<th>Results from</th>
<th>Raw Scores from All</th>
<th>S.D.</th>
<th>Efficiency</th>
<th>Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test (Epre)</td>
<td>242</td>
<td>1.50</td>
<td>20.17</td>
<td>62.17</td>
</tr>
<tr>
<td>Post-test (Epost)</td>
<td>988</td>
<td>2.57</td>
<td>2.33</td>
<td></td>
</tr>
</tbody>
</table>

(5) The learners’ satisfaction towards the computer multimedia edutainment instructional package entitled “Introduction to Statistics” was 3.99 on the average. This means the learners showed high satisfaction towards the developed instructional package as shown in Table 7.

Table 7
Summary of learners’ satisfaction towards the computer multimedia edutainment instructional package entitled “Introduction to Statistics”

<table>
<thead>
<tr>
<th>Items to be Evaluated</th>
<th></th>
<th>S.D.</th>
<th>Satisfaction Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The overall program</td>
<td>3.98</td>
<td>0.51</td>
<td>High</td>
</tr>
<tr>
<td>2. Texts</td>
<td>4.00</td>
<td>0.64</td>
<td>High</td>
</tr>
<tr>
<td>3. Sound Effects and Narration Voices</td>
<td>3.93</td>
<td>0.65</td>
<td>High</td>
</tr>
<tr>
<td>4. Images for Content Clarity</td>
<td>3.89</td>
<td>0.61</td>
<td>High</td>
</tr>
<tr>
<td>5. Content Presentation</td>
<td>4.01</td>
<td>0.57</td>
<td>High</td>
</tr>
<tr>
<td>6. Interactions</td>
<td>4.13</td>
<td>0.70</td>
<td>High</td>
</tr>
<tr>
<td>7. Edutainment and Consolidation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>3.99</td>
<td>0.61</td>
<td>High</td>
</tr>
</tbody>
</table>

RESEARCH DISCUSSIONS

This research was aimed to develop the computer multimedia edutainment instructional package entitled “Introduction to Statistics”. It was found that the efficiency, the learning achievement of the learners and their satisfaction towards the developed instructional package complied with the hypotheses.

The research results revealed that the quality evaluation of the lessons from experts in contents and experts in multimedia technique and production met the specified criteria, in other words, the content quality and the multimedia quality were on the average 4.19 and 4.16, respectively. That was a good quality. The efficiency of the lessons was 82.30/82.33 and met the criteria and the hypotheses set at 80/80. The efficiency of the computer multimedia edutainment instructional package entitled “Introduction to Statistics” during instruction (Epre) was 20.17 and the efficiency after instruction (Epost)
was 82.33. The difference was 62.17. Therefore, the learners could gain higher learning achievement with the statistically significant difference at the 0.01 level.

As for the presentation of the computer multimedia edutainment instructional package entitled “Introduction to Statistics”, the package contained both lessons and entertainment. They were animated images, cartoon animations with narration and sounds. All contents were split into parts so that learners did not get bored before finishing the lesson. The developed computer multimedia edutainment instructional package entitled “Introduction to Statistics” could increase the learning achievement of the learners. This result from using computer multimedia edutainment complies with the research done by Udomlak Anant [9] who developed online edutainment lessons using animation entitled “Measurement and Evaluation in Education” with 30 students at King Mongkut’s University of Technology Thonburi. The efficiency of such online edutainment lessons was 87.58/86.41, higher than the criteria of 85/85. It was found that the post-test scores were higher than the pre-test ones with statistically significant difference at the 0.01 level. Due to the fact that entertainment could arouse learners’ attention, the contents could be absorbed faster, resulting in pleasure in learning. Learners could also remember more contents from edutainment lessons. The learners’ satisfaction towards the developed computer multimedia edutainment instructional package entitled “Introduction to Statistics” was 3.99 on the average. They showed high satisfaction. When each item was considered, it was found that most learners were satisfied with the edutainment and consolidation the most. This item yielded 4.13 on the average. This might be because the researchers made use of cartoon animation with narration to present the contents along with animated graphics. Moreover, there were sound effects and music before and after each lesson units, resulting in learners’ pleasure.

It could be concluded that the computer multimedia edutainment instructional package entitled “Introduction to Statistics” yielded efficiency and high satisfaction and helped increase the learning achievement of the learners.

**SUGGESTIONS**

1. Suggestions from Research Results

   (1.1) The computer multimedia edutainment instructional package entitled “Introduction to Statistics” yielded efficiency for “Introduction to Statistics” course. This might be applied to other courses.

   (1.2) The research results revealed that the efficiency of the computer multimedia edutainment instructional package entitled “Introduction to Statistics” met the specified criteria due to the fact that the edutainment contained not only contents but also entertainment such as animated images, cartoon animation with narration voices, sound effects. Moreover, the contents were divided into smaller units so that the learners did not get bored before finishing each lesson. The learners showed higher learning achievement. This approach could be used in studying and developing other instructional package for other subjects.

   (1.3) The research results revealed that there was interaction between learners and lessons. Learners could respond to the program in form of exercises and practices. Learners could choose what unit to learn first and least because the lessons could show feedback data. This way, the learners were interested and understood the lessons better. This approach could be used in studying and developing computer multimedia lessons for other subjects.

   (1.4) The research results revealed that the computer multimedia edutainment instructional package entitled “Introduction to Statistics” could help the learners learn by themselves. The learners knew their own responsibility because they could spend their free time learning the course anywhere and anytime according to their preferred period. Moreover, they could gain pleasure along with the details of the contents from computer multimedia edutainment instructional package entitled “Introduction to Statistics”. This approach could be used in studying and developing computer multimedia instructional package for other subjects.

2. Suggestions for Further Study

   (2.1) In the next development of the computer multimedia edutainment instructional package, the contents should be developed in such a way that it could interact with games so that the learners could remember and understand the contents better through more interactions and participations. The “Introduction to Statistics” course is still the major course.

   (2.2) There should be a comparative study of learning tools to determine which learning tool is appropriate for the “Introduction to Statistics” course, resulting in learners having higher learning achievement and high satisfaction towards the instructional package. The results could be used in developing other computer multimedia instructional package in the future.

   (2.3) There should be a comparative study of the learning achievement from students who use the computer multimedia edutainment instructional package entitled “Introduction to Statistics” and the learning achievement from students who attend the traditional class.

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