

Application software on malaria for self-learning students.

Manas Kotepui, Kwuntida Uthaisar Kotepui*

Medical Technology Program, School of Allied Health Sciences, Walailak University, Nakhon Si Thammarat, 80161, Thailand

Abstract

Objective: This study aims to develop application software about malarial infection and to compare the efficiency of the application software with a paper-based learning method.

Methods: Application software containing malaria topics was developed by a software developer. The study participants were divided into two groups according to their learning performance. Before learning the material, all participants were tested with the same pre-test. The two groups used the application software and a paper-based method and performed a post-test. Differences between pre- and post-learning by two methods were compared using statistical software.

Results: The result showed that ninety-four participants were enrolled in this study. Forty-seven participants (50%) learned about malaria using the application software, while forty-seven (50%) learned about the same topic using the paper-based method. The mean score of the post-test for both learning methods was significantly higher than the pre-test (p value<0.001). The results also indicated a statistical significance between the post-test score of 1st-year medical technology students and 2nd-year medical technology students (p value<0.001).

Conclusions: Comparison between learning by using the application software and by using the paper-based method indicated that there was no statistically significant difference between the two learning methods provided.

Keywords: Application software, Malaria, Active learning, Medical technology, Student.

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Introduction

In present century, a shift from teacher-centered education to student-centered learning that actualizes the necessity to develop students' ability to learn and self-educate [1]. Non-traditional adult student seems committed to their lifelong learning process and recognize in the higher education [2].

Nowadays, the world has rapid changes in information technology (ICT), the internet particularly in the education sector. Web applications are widely used by various stakeholders, including students, trainers, and academic staff [3]. Computer-based teaching software helps the student-centered learning process, where learners can self-learn and study quickly at their potential. The steps of computer-based teaching are as follows: 1) introduction to motivate the students to learn, 2) presentation of content through complex media, 3) asking question about the topic and assessment through pre-test and post-test, 4) prompt assessment through reflections and answers, 5) providing feedback and helping students to obtain correct answers, and 6) computer-based assessment of learners by way of quiz or examination at the end. A previous study developed an English teaching program for visually impaired children by designing a learning system according to the ADDIE Model. In all, the program consisted of ten topics. Each topic is presented in three parts including

terms, conversations, and tests. The program was used by ten visually impaired 2nd-grade primary school children. The results indicated a high satisfaction for the program [4].

Application software named Green Hyper Mart for botany was developed. This application helps students under 1st grade to learn about the usefulness of plants for human beings. The content of the application comprises of 100 plants, which generates the gross domestic product (GDP) and globally distributed team (GDT) of more than 280 products, economics, nutrients, chemical compositions, and agriproduct processes. The hypertext media presentation includes data, sounds, slides, and motion. The motivation for students to learn is initiated by asking an interesting question, and the motivation continues when students can find the answers by themselves. The results indicated that primary school students and students under 1st grade were interested in using this application for searching for answers and for learning [5]. There is an application for learning physics, including work-kinetic energy using the ADDIE Model. The perspectives of students in regard to graphics, design, performance, and attitude toward the lessons were collected and analysed by the survey method. The results from twenty 6th-grade primary school students indicated that the perspectives on the application with the four parts mentioned above were highly positive. The conclusion was that the ADDIE Model helps improve the efficacy of the learning application [3].

Another previous study examined the learning achievement of high school students using lessons from eLearning courses in information technology. The results revealed that students had a statistically significant greater learning achievement in using the eLearning courses when compared with students in a regular class environment. Moreover, a lesson with illustrated examples of the content can make it fun and enjoyable for the students to self-learn and easier to understand the class content [6,7]. This current study aims to develop application software about malarial infection, which contains interesting content and a brief quiz. This will help students learn by themselves, which is appropriate for the 21st-generation learner who may prefer using digital devices rather than reading on paper.

Methods

For this study, application software about malarial infection was developed (Figure 1). The application contained interesting interactive graphic to help students learn by themselves. The methodology was divided into two parts. The first part involved the design and development of the application software by a developer. The second part involved the participation of the study participants, which consisted of 1st and 2nd-year undergraduate medical technology students who have never learned about malarial infection. For the 1st-year students, they were divided into two groups by random. For the 2nd-year students, they were divided into two groups with equal knowledge according to their learning potential by grade point average. The pre-test was given among the two groups by a paper-based examination. The first group learned about malarial infection by reading the material using the paper-based method. The second group learned about malarial infection by using the application software installed on a computer. The learning process continued for 45 minutes for both groups. The post-test was given among the two groups by a paper-based examination. The difference between pre-test and post-test for students who learned by the paper-based method and by the application software was evaluated by paired t-test using SPSS Statistical Software 11.5 for Windows (SPSS Inc., USA).

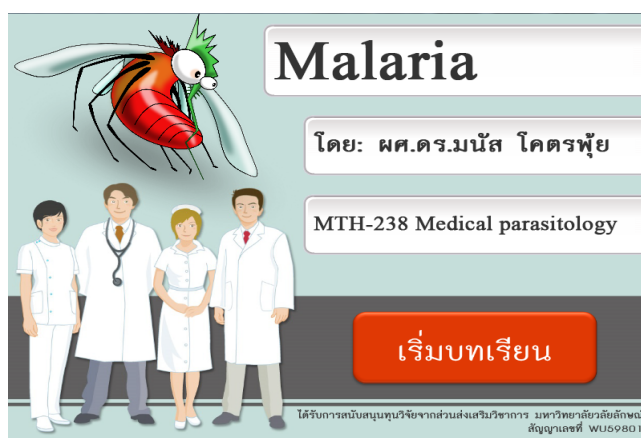


Figure 1. An application software regarding malarial infection.

The protocol of this study was approved by The Ethical Clearance Committee on Human Rights Related to Researches Involving Human Subjects of Walailak University, Thailand (EC number: WU-EC-MT-2-022-59).

Results

The results showed that ninety-four participants were enrolled in this study. Eleven (11.7%) were male and eighty-three (88.3%) were female. Among the ninety-four participants, fifty-one (54.3%) were 1st-year medical technology students, whereas forty-three (45.7%) were 2nd-year medical technology students. Participants were divided into two groups. Forty-seven were learning by using the application software, whereas the other forty-seven were learning by reading the material on paper. The pre-test examination consisted of a total possible score of 20 points, and the results showed that the minimum score was 2 points, the maximum score was 14 points, and the mean with standard deviation was 6.41 ± 2.11. The post-test examination consisted of the same total possible score of 20 points, and the results showed that the minimum score was 7 points, the maximum score was 19 points, and the mean with standard deviation was 15.39 ± 2.57. The mean score of the post-test was significantly higher than that of the pre-test (p value<0.001 by Wilcoxon Signed Ranks Test) (Table 1).

Table 1. Comparison of score between pre-test and post-test.

Score	Minimum	Maximum	Mean ± S D	p value*
Pre-test	2	14	6.41 ± 2.11	<0.001
Post-test	7	19	15.39 ± 2.57	

*Tested by Wilcoxon Signed Ranks Test

According to the pre-test examination, the results indicated no statistical significance of the median score between learning by using the application software and by using the paper-based method (p value=0.335). According to the post-test examination, the results indicated no statistical significance of the median score between learning by using the application software and by using the paper-based method as well (p value=0.333). According to the pre-test examination, the results indicated no statistical significance of the median score between 1st-year medical technology students and 2nd-year medical technology students (p value=0.071). According to the post-test examination, the results indicated a statistical significance of the median score between 1st-year medical technology students and 2nd-year medical technology students (p value<0.001) (Table 2).

Table 2. Comparison of score between 1st-year Medical Technology student and 2nd-year Medical Technology student.

	Type of test	Min score	Max score	Mean ± SD	p value of pre-test*	p value of post-test*
1 st -year Medical Technology student (N=51)	Pre-test	2	12	6.04 ± 2.04	0.071	<0.001
	Post-test	7	19	14.41 ± 2.80		
2 nd -year Medical Technology student (N=43)	Pre-test	3	14	6.86 ± 2.13		
	Post-test	12	19	16.56 ± 1.65		

*Tested with Mann-Whitney U Test

Discussion

This study aimed to develop application software about malarial infection to assist students in self-learning. The software contained interesting content along with interactive buttons to help students who like to use laptop or desktop computers for easy and interactive learning. Among the ninety-four participants divided into two groups, forty-seven learned about malarial infection by using the application software and another forty-seven learned about the same topic by using the paper-based method. Pre-test and post-test were used for evaluate all students [8-10].

For the pre-test examination, the students had an average score of 6.41 out of 20. This may be due to the fact that all participating students had never learned about malarial infection, which was the inclusion criterion of this study. This ration caused a low average score on the pre-test among the two groups of students. For the post-test examination, the students had an average score of 15.39 out of 20, which was significantly higher than that of the pre-test. This may be due to the fact that all students learned about malarial infection between exams during their reading of the material by either of the two types of learning methods. This ration caused a high average score on the post-test among the two groups of students. Comparison between learning by using the application software and by using the paper-based method indicated that there was no statistically significant difference between the two learning methods provided.

This demonstrated that the application software could not improve the learning efficacy of the students, although some factors may have interfered with the experiment. The probability of this interference might be due to two factors. The first factor was that students using the paper-based method could write on the paper during the learning process. Writing notes on the sheet of paper might have helped students remember what they were reading. In contrast, students reading from the application software could not write down any words

or sentences. The second factor was that the experience of learning by the paper-based method is the main learning method used by teachers or lecturers of which students are familiar with. However, comparison the scores between the 1st-year medical technology students and the 2nd-year medical technology students, the 2nd-year medical technology students had a significantly higher average score than that of the 1st-year medical technology students. This might be due to the fact that 2nd-year students have more experience in learning and studying when compared to the younger 1st-year students.

Limitations

The limitations of this study included the following: 1) reflections on using the application software were not obtained from the participating students to help develop the program, and 2) the pre-test and post-test were similar and may have resulted in the same efficacy of learning between the two types of learning methods. Future studies need to design the appropriate methodology to evaluate the efficacy of learning between using new methods and traditional methods of learning.

Conclusion

Learning by using the application software and by using the paper-based method was no statistically significant difference between the two learning methods provided. This demonstrated that the application software might not be able to improve the learning efficacy of the students.

Ethics Approval and Consent to Participate

Protocol of this study was approved by The Ethical Clearance Committee on Human Rights Related to Researches Involving Human Subjects of Walailak University, Thailand (EC number: WU-EC-MT-2-022-59). Informed consent forms were obtained from all participants.

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*Correspondence to

Kwuntida Uthaisar Kotepui
 Medical Technology Program
 School of Allied Health Sciences
 Walailak University
 Nakhon Si Thammarat
 Thailand