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Assessment of computer-assisted instruction multimedia: Place Around Me for enhancing English proficiency of 3rd-grade students

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ABSTRACT

This research aimed to evaluate teaching material in the form of computer-aided instruction multimedia named Place Around Me (PAM), which was created and developed for 3rd-grade students of English subject to assist in the class teaching activities of instructors and enhance students' English language proficiency. PAM was developed using Construct 3 and Blender software to decorate animation, scenes, and various media objects. Thirty 3rd-grade students from Anuban Tak School, Mueang Tak District, Tak province, Thailand, were assigned as sample volunteers to evaluate PAM for their satisfaction based on content aspects, appropriate media style, benefits, and use, using descriptive statistics. The effectiveness of innovations was assessed using the ratio of the efficiency of the process to the efficiency of the product. Results indicated that overall student satisfaction in content aspects based on a 5-point scale was at 4.39 or very good, media style at 4.57 or very good, media functional aspects at 4.43 or very good, and benefits and used at 4.48 or very good. The ratio of the efficiency of the process to the efficiency of the product or the effectiveness of innovations was 0.74. The results indicated that PAM is appropriate in contents, styles, functions, benefits, and practical innovation that enhances teaching and students' English proficiency.

Keywords: Computer-Assisted instruction, 3rd-grade student, Place around me

INTRODUCTION

English is a global language, and its importance is increasingly recognized in Thailand. However, the English proficiency of Thai people, particularly students, remains low. According to the National Institute of Educational Testing Service (NIETS), high school students had the lowest average English score at 43.55 in the Basic National Educational Test 2020 compared to seven other core subjects such as Mathematics, Science, etc. (NIETS, 2020). Nowadays, computer-aided instruction multimedia plays a massive role in supporting teaching and learning. Because teaching and learning styles have been changed from teacher-centered patterns, students are allowed to engage in self-learning activities and group activities that push the learners to the center of learning; the teachers would change roles and act as mentors and coordinate activities for learning, make students enjoy learning without feeling bored and can review the contents that students have learned in class as well. For these circumstances, computer-aided instruction materials have gained their roles in supporting and encouraging learners to learn at their places. At the same time, teachers can apply them to make teaching more efficient.

Yookuan (2017) reported positive outcomes from the development of computer-assisted instruction with the basic English vocabulary for the daily life of Grade 1 primary school students in Banhinwua School, Ranong province, with the effectiveness of innovations at 81.07/86.56 by meeting the set E1/E2 equal 80/80 criteria, and had statistically significantly difference ($P < 0.01$) with the higher post-study score than the pre-study score. Worawong and Charoenjitkarn (2015) mentioned that the efficiency of the computer-assisted instruction on topographies of the region lesson stand of the social study religion and culture for grade 5 primary school students of Banplongliamschool was 80.56/81.89, which met the criteria and obtained the higher post-test score than the pre-test score ($P < 0.01$). Similar results were observed by Oungthong (2018), who reported good results in using computer-assisted instruction on sharpening cutting tools for first-year students of the Department of Teacher Training in Mechanical Engineering, Faculty of

Technical Education, King Mongkut's University of Technology North Bangkok. In addition, computer-aided instruction multimedia could be adapted and modified to create new learning experiences, knowledge, and science, which are considered mediums that support the student-centered teaching and learning processes. This research addressed this issue by creating and evaluating the potential of computer-assisted instruction multimedia like Place Around Me (PAM) to enhance English learning proficiency, especially for beginning learners.

MATERIALS AND METHODS

Participations

The sample groups comprised five English teachers and 30 Grade 3 students from Anuban Tak School, Mueang Tak District, Tak, Thailand. English language teachers were required to study user requirements for teaching, teaching content, and problems encountered, and students participated in usage tests and questionnaires.

Computer-aided instruction multimedia

The computer-aided instruction multimedia PAM was developed following Vilailak (2008). Contruct 3, a game engine design, was applied to create the lesson. Then, Blender was used to create scenes, characters, and buttons for teaching materials.

Construct 3

Construct 3 is a Game Engine designed and developed by Scirra Ltd. It is accessible only at the basic creation level, but payment is required to upgrade to the full version to advance with a high-level, complex game. The full version is available at www.construct.net. The game also contains a Guided Tour button, a tutorial on how to create the game, moving objects, and animation by Goodi3 (2023).

Blender

Blender is a 3D modeling program. Like other 3D programs, it can create various 3D models, such as characters, artifacts, etc. However, Blender's advantage is that it is available for free download under the GNU GPL (General Public License). This research generated characters, models, and buildings for 3D animation using Blender: Southeast Bangkok University (2017).

System Design

The computer-aided instruction "Place Around Me" was divided into five sections (Figure 1), including the instructions section, pre-class quiz section, lesson section, after-school quiz section, and game section. The pre and post-class tests consist of 15 questions each; the lesson section has three chapters: Place, Direction, and Sentence Grammar. In the game section, there are 3 games: word-to-sentence filling games, picture-matching games, and location-based games. A storyboard is used in media story design.

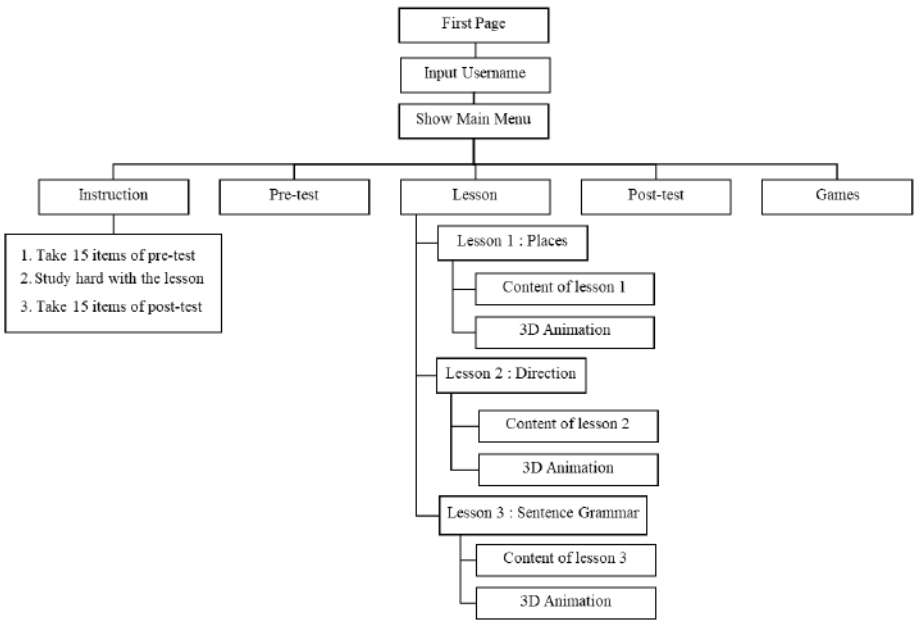

Figure 1. System design of PAM.

Storyboard

Storyboarding is a visual planning tool used in various industries, such as film, animation, advertising, and software development, to outline the sequence of events or interactions in a project. This research used a storyboard to design each scene in the lesson. The storyboard is divided into three chapters: places, direction, and sentence grammar. The storyboard examples are shown in Figure 2.

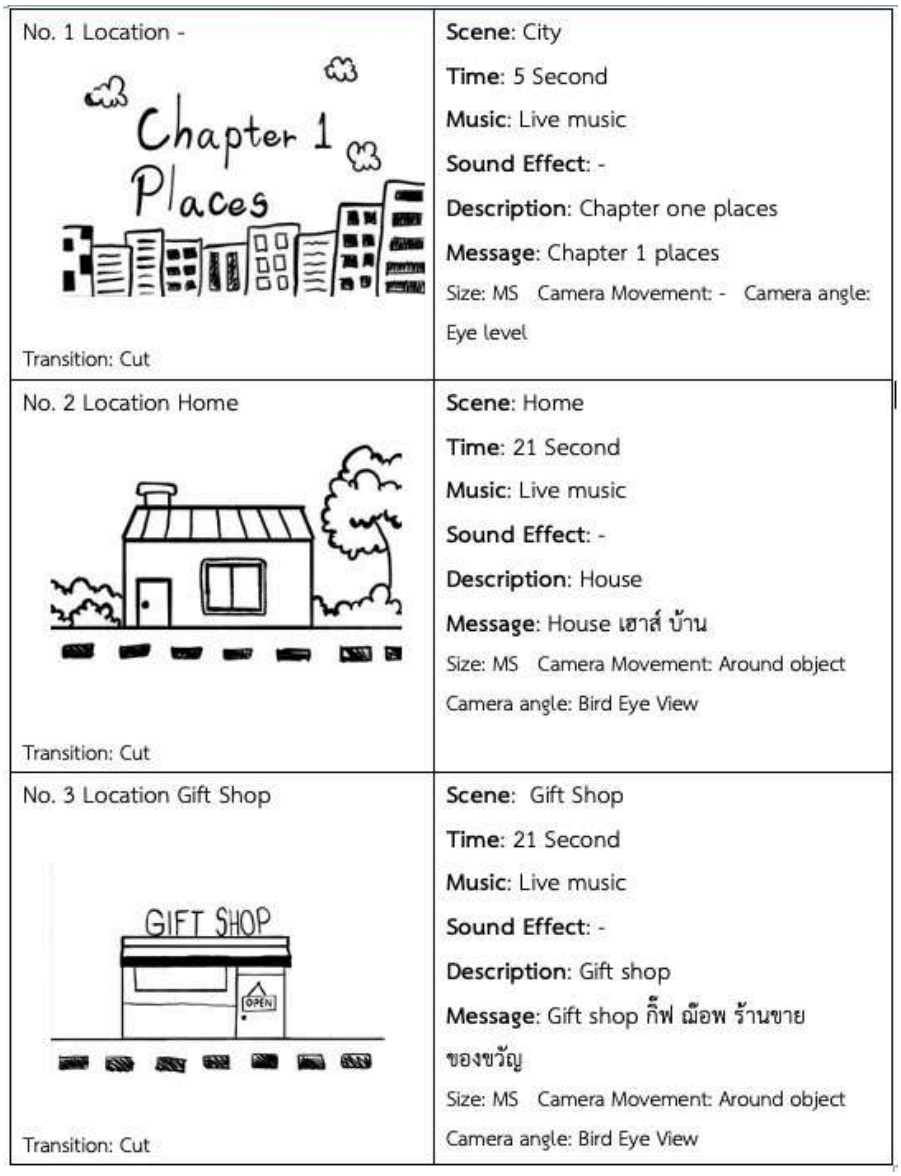

Figure 2. Storyboard example.

Data Analysis

Data were collected according to measure the satisfaction parameters of computer-aided teaching materials PAM using 5-point scales of satisfaction for assessment as follows:

A score of:

4.51 – 5.00 means that usage is at the best level or excellence
3.51 – 4.50 means that usage is very good
2.51 – 3.50 means that usage is moderate or fair
1.51 – 2.50 means that usage is low or requires improvement
1.00 – 1.50 means that usage is minimal or poor

Excellence	Good	Fair	Improvement	Poor

Then, data were analyzed using descriptive statistics, including percentage, mean, and standard deviation.

The effectiveness of innovation in teaching and learning was determined using the E1/E2 criteria; the criteria were set at 70/70, according to Chaiyong (2013). E1/E2 is a measure of the effectiveness of teaching and learning of students in the form of percentages in the E1 and E2 criteria as follows:

$$\mathrm{E1} = \frac{\bar{x}(pre - test)}{Full\ Score}\ x\ 100$$

Where: E1 is the effectiveness of innovations noted in teaching reported as a percentage of exercises or study activities during study,

$\bar{x}$ is the summary points obtained by taking the pre-test exam, and the full score variable is the full score of this pre-test.

$$\mathrm{E2} = \frac{\bar{x}(post - test)}{Full\ Score}\ x\ 100$$

Where: E2 is the effectiveness of innovations noted in teaching as a percentage of exercises and activities studied,

$\bar{x}$ is a summary point obtained by taking the post-test, and the full score variable is the full score of this post-test.

RESULTS AND DISCUSSION

Once the system is designed and computer-aided teaching multimedia is created, it can work according to the objectives. Before this system can be implemented, it must be tested using computer-aided teaching materials to know whether the various parts of the work function properly. After designing the system, teaching materials were created with the following results (Figures 3 to 10).

Figure 3. Computer-aided lessons home page.

Figure 4. Enter the learner name page.

Figure 5. Menu page.

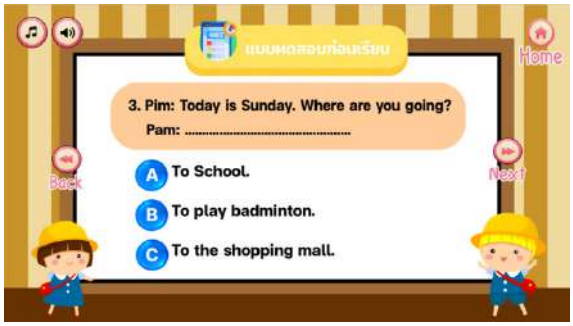

Figure 6. Quiz page.

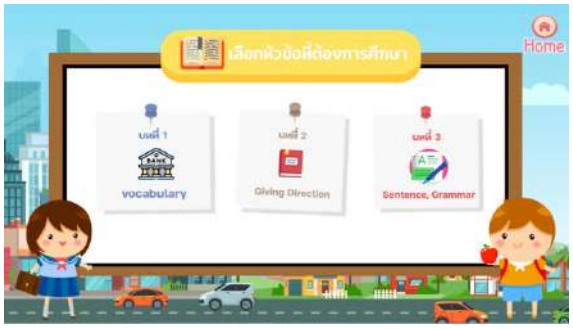

Figure 7. Topics page.

Figure 8. Lesson 1 page.

Figure 8. Lesson 2 page.

Figure 8. Lesson 3 page.

The student samples were divided into two groups by sex, including 13 males and 14 females; all were grade 3rd students. Their satisfaction results are in Table 1.

According to Table 1, the assessment of the contents was divided into five topics to observe the accuracy and appropriateness of content aspects of PAM. Topics were: 1) the content is complete, 2) the content is easy to understand, 3) the content is diverse, 4) the content meets user needs, and 5) the content is up to date. Results indicated that satisfaction with all topics was scored at very good levels, with scores of 4.37, 4.30, 4.50, 4.07, and 4.37, respectively. The overall mean was 4.39.

Table 1. Satisfaction score based on content aspects of PAM

Items	Accuracy and appropriateness level						
	Excellence	**Good**	**Fair**	**Improve**	**Poor**	**Mean**	**SD**
1) The content is complete	43.33%	50.00%	6.67%	0.00%	0.00%	4.37	0.60
2) The content is easy to understand	40.00%	50.00%	10.00%	0.00%	0.00%	4.30	0.64
3) The content is diverse	56.67%	33.33%	3.33%	6.67%	0.00%	4.50	0.84
4) Content meets user needs	56.67%	36.67%	6.67%	0.00%	0.00%	4.07	0.62
5) The content is up to date	46.67%	43.33%	10.00%	0.00%	0.00%	4.37	0.66
Overall mean						**4.39**	**0.67**

In Table 2, the assessment of satisfaction with media style was divided into five topics to observe PAM's content aspects' accuracy and appropriateness. Topics were: 1) beautiful/attractive, 2) content categorization, 3) the format and method of presenting the content, 4) font suitability and size, 5) color tone appropriateness, and 6) appropriateness of the information used in the lesson. Results indicated that all topics scored at very good levels, with 4.53, 4.53, 4.60, 4.63, and 4.47, respectively. The overall mean was 4.57.

Table 2. Satisfaction score based on the media style of PAM

Items	Accuracy and appropriateness level						
	Excellence	**Good**	**Fair**	**Improvement**	**Poor**	**Mean**	**SD**
1) Beautiful/ Attractive	60.00%	33.33%	6.67%	0.00%	0.00%	4.53	0.62
2) Content categorization.	73.33%	20.00%	6.67%	0.00%	0.00%	4.53	0.67
3) The format and method of presenting the content.	63.33%	33.33%	3.33%	0.00%	0.00%	4.60	0.50
4) Font suitability and size.	63.33%	33.33%	3.33%	0.00%	0.00%	4.60	0.50
5) Color tone appropriateness.	70.00%	23.33%	6.67%	0.00%	0.00%	4.63	0.60
6) Appropriateness of the information used in the lesson.	53.33%	40.00%	6.67%	0.00%	0.00%	4.47	0.62
Overall mean						**4.57**	**0.59**

Table 3, the assessment of satisfaction with functional aspects was divided into 4 topics to observe the accuracy and appropriateness of content aspects of PAM. Topics were: 1) computer lessons are convenient, easy to use, and not complicated; 2) ease of taking the exam in computer lessons; 3) the mini-games are easy to use; 4) 3D animations with appropriate content and easy to understand. Results indicated that all topics scored at very good levels, with 4.50, 4.43, 4.50, and 4.30, respectively. The overall mean was 4.43.

Table 3. Satisfaction score based on functional aspects of PAM.

Items	Accuracy and appropriateness level						
	Excellence	**Good**	**Fair**	**Improve**	**Poor**	**Mean**	**SD**
1) Computer lessons are convenient, easy to use, and not complicated	66.67%	23.33%	6.67%	0.00%	3.33%	4.50	0.89
2) Ease of taking the exam in computer lessons	56.67%	36.67%	3.33%	0.00%	3.33%	4.43	0.84
3) The mini-games are easy to use	63.33%	30.00%	3.33%	0.00%	3.33%	4.50	0.85
4) 3D animations with appropriate content and easy to understand	46.67%	36.67%	16.67%	0.00%	0.00%	4.30	0.74
Overall mean						**4.43**	**0.83**

In Table 4, the assessment of satisfaction with benefits and uses was divided into four topics to observe the accuracy and appropriateness of content aspects of PAM. Topics were: 1) 1) content can be put to good use; 2) media is a source of knowledge and can be referenced; 3) media that can be used in everyday life; 4) media can be used as a teaching medium as well. The results indicated that all topics scored at very good levels: 4.63, 4.30, 4.43, and 4.53, respectively. The overall mean was 4.48.

Table 4. Satisfaction score based on benefits and uses of PAM.

Items	Accuracy and appropriateness level						
	Excellence	**Good**	**Fair**	**Improvement**	**Poor**	**Mean**	**SD**
1) Content can be put to good use.	73.33%	16.67%	10.00%	0.00%	0.00%	4.63	0.66
2) Media is a source of knowledge and can be referenced.	36.67%	56.67%	6.67%	0.00%	0.00%	4.30	0.59
3) Media that can be used in everyday life.	66.67%	16.67%	13.33%	0.00%	3.33%	4.43	0.96
4) Media can be used as a teaching medium as well.	60.00%	33.33%	6.67%	0.00%	0.00%	4.53	0.67
Overall mean						**4.48**	**0.70**

To determine the effectiveness of innovation in teaching and learning using the E1/E2 criteria, according to Chaiyong (2013). Based on student pre-and post-test scores, it was found that all 30 students had an average pre-study score of 7.5 points out of 15 points and an average post-study score of 10.10 points out of 15 points. When substituting the values in the formula, it was found that the value of E1 is 50, and the value of E2 is 67.33. Then, the ratio of E1/E2 was 50/67.33, equal to 0.74, which was relatively low. In addition, the gap between E1 to E2 was 25.73%. Chaiyong (2013) mentioned that the range between E1 and E2 scores should be less than 5%; if it is more than 5%, it means

that the student activities between pre-and post-test exams are imbalanced; it indicates that the exam is more accessible or is imbalanced with the work assigned and needs to be adjusted.

CONCLUSIONS

PAM was a computer-aided multimedia instruction program developed to enhance the English proficiency of grade 3rd students at Tak Kindergarten School. After development, an assessment of PAM was conducted to evaluate satisfaction and the effectiveness of innovation. According to those results, PAM was a perfect tool and appropriate for enhancing students' English proficiency. However, student activities between pre- and post-test exams should be adjusted to increase the precision of PAM in terms of the effectiveness of innovation in teaching and learning for students due to the wide range between E1 and E2.

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