Developing a Computer Assisted Instruction with Drill and Practice for English Teaching to Primary School Grade 6 Students with Hearing Impaired

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Abstract - Nowadays, teaching and learning have focused on the development to increase opportunities for individuals’ education. But hearing-impaired students are at a disadvantage in learning, because they have to use visual sign language for learning activities, like teamwork, discussions, presentations, and etc. are not practical in a traditional classroom environment. The objectives of this research were to: 1) develop a Computer Assisted Instruction (CAI) program that incorporated drilling and practice; 2) compare the learning achievement of students before and after using the newly-developed CAI with drilling and practice; and 3) determine the satisfaction of hearing-impaired students with that CAI with drilling and practice.

The sample for this study consisted of 20 hearing-impaired primary school students from Grade 6 at the Surin Deaf School, Bureau of Special Education, during academic year 1/2011. The experimental tools included the newly-developed CAI that incorporated drilling and practice, a student-taken achievement test, and a questionnaire for evaluating the student’s satisfaction with the program. The results were as follows: the new CAI had an efficiency of 81.78/80.09, which was higher than the predefined criterion of 80/80; the learning achievement after using the CAI was higher than before at .05 levels of statistic significance; and the students’ satisfaction level was good.

Keywords - Computer Assisted Instruction, Hearing Impaired, English Teaching

I. INTRODUCTION

Education is the basis in developing the nation’s prosperity on par with other countries. It is a crucial foundation to improve the lives of people and society. In addition, it is stimulating growth in the individual and society. However, education for children with disabilities has not been developed as substantially as it should have been. Hearing impairment is a disability category which affects an increasing number of people. Currently, there are schools for teaching children with impaired hearing, so these children can learn on par with normal children. But teaching for children with impaired hearing have the opportunity to equal with normal, it's difficult. Because the barriers to teaching and learning. Consider the elements of these issues: due to problems and obstacles to teaching and learning, the composition of these problems can consider from instructor, methods of teaching, and learners. Teachers lack knowledge and understanding on how to improve existing, or develop new, teaching methods [1]. Often teachers use traditional teaching methods, for which there is relatively little use of innovation and technology in the teaching and
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learning processes.

However, a study about the teaching of children with disabilities found that the teachers of children with disabilities used the same course as normal children, except used sign language in place of verbal language to communicate in lectures and discussions. There were no special course designed to meet the needs of disabled learners. The students’ achievement using these methods was lower than a set threshold. These problems are from that part of recognition is missing. Especially, English subject which is the first foreign language which the Thai Ministry of Education integrated it into the primary and secondary school curriculum. The Thai Government has forced all schools to teach English from Primary school [2] to cultivate good attitudes to English learning, and focus on using English to develop the students' language skills. The problems of English teaching for children are low existing skill levels, which is especially true for children who are hearing-impaired.

The advancement of science and computer technology has influenced change in the communication and the dissemination of data. It is important for education to evolve and bring in computer and Internet technology for presenting and transferring knowledge to learners, and to provide enhanced opportunity for learning. However, students with hearing impairment are at a disadvantage in learning because they use sign language for communication, and [4] because in the communication, this group of people must have commandment as sign language for understanding of the communication. Thus, to provide an opportunity for the students with hearing impairments to learn just as normal students, and encourage students’ learning success, it is necessary to develop suitable teaching materials, stimulate interest, and enhance the intellectual development and social development for students. The electronic materials are parts of the materials which attract the attention of the participants is great, because these media have the ability to present by using multimedia such as characters, text, graphics, and sign language. They make learning fun and student-centered, and respond individual differences [5, 6]. It also grants students with hearing impairments with the opportunity to learn as much as normal individuals. As well, it helps perception development and enhances the ability of the disabled individual in learning. In addition, it improves the development of disabled children’s life quality as equated to the normal children.

Therefore, based on the results of the aforementioned studies, in order to comply with the Constitution of the Kingdom of Thailand and life quality of students with hearing impairment, this study aims to develop Computer Assisted Instruction (CAI) with drilling and practice, targeted for teaching English to hearing-impaired primary school grade 6 students. To measure the effectiveness of the program, the study compares the learning achievement of students before and after using this CAI, and studies the satisfaction of students who used it. In addition, assumptions of this research have three elements as follows: First, the CAI with drill and practice has a predefined efficiency criterion of 80/80. Second, the measurement of learning achievement and determination of the CAI’s effectiveness uses a statistic level of 0.05. Finally, the satisfaction of overall student learning is positively related with this CAI.

II. LITERATURE REVIEW

A. The Basic Education Core Curriculum B.E. 2551 (A.D. 2008) Foreign Language

Therefore, learning a foreign language consists of four elements as follows: English for communication, language and culture, language and learning relationships with others, and language and the relationship with the community and the world [7].
B. Computer Assisted Instructional (CAI) and Drill and Practice

The CAI can be divided into several categories. Based on the principle of education theory, there are five elements [8] as follows: tutorial, drill and practice, simulation, instructional game, and test. The basic of CAI with drill and practice is used after learning and teaching. This CAI is available for use by students in almost all subjects, to practice the knowledge they have learned [8]. It combines a tutor in the format of the test. The content will focus on knowledge and exercises. So the media’s being used with other activities, such as normal teaching, remedial and enrichment instruction, etc. [8] when the students completed the exercises, lessons will show feedback. If students make correct answer, they can continue next exercise. But if they make the wrong answer, it has a key to provide student study and edit [9]. Thus, these mediums are appropriate for use in the regular classroom to review the knowledge and understanding of past content.

C. Principles of the Electronic Media Design

Principles of the electronic media design have nine elements [10] as follows:

1) Gain Attention: Early in the learning process, it is essential that the learners are motivated. Lessons should be designed and developed using multimedia such as characters, text, and graphics.

2) Define Objectives: This phase is learning objectives; students will know in advance about the key issues of the content and content layout, then the teacher will tell the learners the learning objective.

3) Activate Prior Knowledge: Ask for recall of existing relevant knowledge, and then the design of electronic media must find a way to evaluate new knowledge, and prepare students to be ready to accept the new knowledge, to determine the basic knowledge of the learner. If a lesson is sequential learning, the review of knowledge may be in the form of encouraging the students to think about previous learning.

4) Present Information: It is presenting a stimulus that is related to the subject matter, the contents are must so clear indication of features such as underlining, bold print, highlighting, and pointing to emphasize major themes is helpful.

5) Guide Learning: The teacher has to provide learning guidance or advice, until the students are able to find the answers themselves.

6) Elicit Responses: Learners respond to demonstrate knowledge and understanding of the course. This provides learners with opportunities to apply knowledge and practice skills through a real-life application activity.

7) Provide Feedback: Give informative feedback on the learner's performance.

8) Access Performance: to monitor the student’s progress and has students self-assess in their progress. Performance and student’s knowledge may be measured using quizzes or other post-tests. Tests should be ordered based on the learning objectives. If there are many lessons, the instructors could be split into sections of the test.

9) Promote Retention and Transfer: to enhance retention and transfer of information by helping them see the information learned in practice, such as conclusion of contents and other suggestion, etc., to provide students the opportunity to review and question before the lesson finishes.

III. THE SAMPLE AND THE DEVICES

1) The population was 40 students of hearing-impaired primary school grade 6th academic year 1/2011 at Surin School for the Deaf, Bureau of Special Education, Thailand. The sample of this study was 20 students from a simple selection.

2) The experimental tools were CAI with drill and practice, achievement test (pretest, posttest), and student’s questionnaire for evaluating satisfaction.

3) The lessons have four content sections as follows: my story, my family, animals and good health. Each lesson consists of the learning objectives, pre-test, contents, quizzes, post-test, and reported grades.
4) This research uses One Group Pretest Posttest Design [8] and t-test (dependent) which has set a level of statistical significance at the .05 level, and analyze the satisfaction of the students with CAI by using Likert.

IV. METHODOLOGY

The research methodology of the ADDIE model contains the following steps: [12]

1) Analysis: (A)
This step, researchers study and analyze as follows: The first step needs analysis of the mentioned problems of disabled students’ education in Thailand. It found that the disabled student’s education curriculum is the same as normal children’s education, simply communicated using sign language instead of verbally. The next step is analyzing the learners’ basic knowledge of English from the teacher who taught English. It found that hearing-impaired students have lower score than normal students. The last step, researchers analyzed the contents to be consistent with core curriculum of the English language.

2) Design: (D)
In the second step, researchers design the learning objective in ABCD format, and learning achievement assessments - quizzes, pretest, and posttests, which are multiple-choice. After that, all tests were evaluated by content experts to find the index of item objective congruence (IOC). Then, determine that the students who had studied English for doing the test. Next, the students’ test scores were analyzed for quality, reliability, discrimination, and difficulty. The last procedure of this step, researchers design the storyboard and system flowchart.

3) Development: (D)
The researchers develop this CAI using the following steps: Using Moodle, which is a learning management system (LMS), and CourseLab 2.4, the researchers create multimedia presentations for the teaching content and develop the CAI, using the principles of electronic media design:
- Gain Attention: This lesson is designed and developed using multimedia such as characters, text, and graphics to motivate the students’ interest.
- Define Objectives: This phase has the presentation objectives with text and sign language on video.
- Activate Prior Knowledge: This part of the lesson activates prior knowledge of the learner by providing a pretest for the lesson.
- Present Information: There are pictures and sign language on video in the presentation of each lesson and there is presentation of short sentence.
- Guide Learning: There are facilitated tools which consist of webboard and chat room for guiding learners who have learning problems, and to give the opportunity for students to ask the teacher questions.
- Elicit Responses: There are facilitated tools which consist of webboard and chat room to allow interaction and share responsibility or knowledge between the students, instructor and other students.
- Provide Feedback: There’s responding to feedback immediately for doing quizzes when finished. If the student answers the question correctly, students will gain recognition. But if the student answers the question wrongly, students will be blamed. After that, the answer key is shown to the learners. In addition, if they don’t want to watch a sign language video, they can close it immediately.
- Access Performance: There are two tests: the pre-test and post-test. For each test, the system will report the learner's score and learning progress.
- Promote Retention and Transfer: This is last process; it is a presentation of lesson’s conclusions.

This CAI was evaluated by three technique experts. The recommendations from the experts were regarding to the font color, size of font, and presentation of video: the presenter should wear a black shirt and be in front of a blue background. After that,
the researchers improved and modified it from the experts' recommendations. From that time, the researchers improved CAI and used it with three Grade 5 students by selecting participants of different grade levels (excellent, medium, and poor). The students were interviewed to the error of this tool. The researchers improved this CAI using the students’ recommendations and observations. After that, this CAI was used by six students which has selecting by participants’ different grade levels. The students were interviewed to the error of this tool. The researchers further improved this CAI again upon the recommendations of the six students.

4) Implementation: (I)

This phase, the CAI with drill and practice was used by a sample group consisting of 20 students from a hearing-impaired primary school grade 6. The students and teachers can access the CAI from the URL: http://203.158.201.2/cpt/moodle.

Each computer is provided for each student. They learn and do the exercises and on this CAI. It was used by the sample group for three weeks: 3-4 days/week: 1.5-2 hrs./day during the first semester of academic year 2011 (2011 Aug. 22 to 2011 Sep. 19).

5) Evaluation: (E)

After this CAI was implemented by sample group, the data were analyzed to determine the resulting metrics for: learning’s efficiency, learning achievement, and learners’ statistic significantly.

V. RESULTS

The researchers have developed the CAI with drill and practice. Presentation is branching and multimedia such as animation, graphics, and etc. It also has features to enable students' interaction, such as clicking, dragging and dropping, text, and etc. (as shown in Fig 1-2)

1) The results of analysis on the effectiveness of CAI with drill and practice.

TABLE I
THE EFFECTIVENESS OF CAI WITH DRILL AND PRACTICE.

<table>
<thead>
<tr>
<th>Data</th>
<th>N</th>
<th>X</th>
<th>Score</th>
<th>Total Score</th>
<th>Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise (Drill and practice)</td>
<td>20</td>
<td>130.85</td>
<td>160</td>
<td>2617</td>
<td>81.78</td>
</tr>
<tr>
<td>Posttest</td>
<td>20</td>
<td>152.55</td>
<td>54</td>
<td>865</td>
<td>80.09</td>
</tr>
</tbody>
</table>

Table I shows that this CAI with drill and practice had an efficiency of 81.78/80.09 which was higher than the predefined criterion of 80/80.

2) The results of analysis on the achievement of Students with CAI with drill and practice.

TABLE II
ACHIEVEMENT OF STUDENTS WITH CAI WITH DRILL AND PRACTICE.

<table>
<thead>
<tr>
<th>Data</th>
<th>N</th>
<th>X</th>
<th>S.D</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>20</td>
<td>14.45</td>
<td>3.068</td>
<td>26.548</td>
<td>.00*</td>
</tr>
<tr>
<td>Posttest</td>
<td>20</td>
<td>43.25</td>
<td>3.322</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Statistic level of .05
Table II shows that the learning achievements from pre-test and post-test with this CAI found that $t$-test $= 26.548$ at the statistic level of $.00$, which shows that the learning achievement after using this CAI was higher than before at the statistic level of $.05$. The average of pre-test’s score and post-test’s score are 14.45 and 43.25 (54 total score). In conclusion, students who learn with this CAI had high achievement learning.

3) The results of students’ statistical significance

The results show that most students performed as follows: first, this CAI motivated the students’ interest for learning ($\bar{x} = 4.80$, $SD = 0.410$). Second, appropriateness of the colors (background, font, characters) ($\bar{x} = 4.75$, $SD = 0.550$). The third, the presentation in the content/drill and practice is appropriate ($\bar{x} = 4.75$, $SD = 0.444$). The fourth, appropriateness of the alphabet ($\bar{x} = 4.65$, $SD = 1.131$) respectively. The overall, can be concluded that ($\bar{x} = 4.48$ and $S.D = 0.551$) and shows that most learners’ satisfaction level is good with this CAI.

VI. CONCLUSIONS

1) The CAI with drill and practice had an efficiency of 81.78/80.09 which was higher than the predefined criterion of 80/80.

2) The learning achievement after using the CAI with drill and practice was higher than before at .05 levels of statistical significance. The average of pre-test’s score and post-test’s score are 14.45 and 43.25, respectively. In conclusion, the participants who got to learn with this CAI had high achievement learning.

3) The students’ satisfaction level is good with the CAI with drill and practice.

DISCUSSION

1) General Recommendation: It should develop the other CAI model for English. In addition, students’ prior knowledge may affect the pre-test’s scores. Therefore, the score of test may not always be based research.

2) Recommendation for Research: It should comparatively students’ achievement with various CAIs for studying the type of CAIs have related or affect with achievement or not, because each CAI has different features.

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REFERENCES

(Arranged in the order of citation in the same fashion as the case of Footnotes.)


[5] Yan, H. and Gang, Z. “Virtual Classroom with Intelligent Virtual...


