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Instructional Design of a Learning Package of English Alphabet

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Abstract—The pervasive use of interactive multimedia technology in education has brought a dramatic change in early childhood education. The effectiveness of any interactive multimedia learning package is highly dependent on its content design and user interface. This paper describes the instructional design of a multimedia package, AlphabetStory, for learning the alphabet. The instructional design model consisting of the five phases—analysis, design, development, implementation and evaluation (ADDIE Model) was used to analyze, design, develop, implement and evaluate the contents of AlphabetStory. Kindergarten principal, teachers and children were invited to participate in the analysis and evaluation phases. Positive feedback from the pre-school teachers on the package, and the 10 pre-school children who participated in the evaluation indicate that AlphabetStory is well-designed, and can assist children aged three to six years to learn the 26 letters of the alphabet, at their own pace, with fun and easily.

Keywords—instructional design; multimedia learning package; pre-school children; learning alphabet; AlphabetStory

I. INTRODUCTION

The pervasive use of computers in education has dramatically changed children’s learning abilities in mathematics, enriched and extended their experience, as well as improved their creativity and academic performances in schools, and even in the early childhood education environment [1, 2]. Many studies have been conducted on the use and effects of ICT. Computer Assisted Instruction (CAI) and interactive multimedia technology on early childhood education [3]. O’Hara [4] reported that ICT can promote creativity in children; improve their learning skills and abilities; and improve their social skills. Studies have also shown that the use of multimedia technology in education can greatly improve the learning abilities of children even those aged between three and five years. He [5] found that children show great keenness and enjoy using multimedia programs and most of them are able to follow the instructions. He also reported that the use of appropriate materials in those programs is very effective in capturing the children’s attention and interest.

Another study found that children who used CAI programs on PlayStation are better in spelling, and reading. CAI programs also effect greater improvement in phonological composition. It also makes the children pay more attention and is not easily bored, when compared with traditional teaching methods [6]. A study in the Netherlands found that the vocabulary (literacy skill) of the children improved significantly after they were trained using the story and the vocabulary part of a friendly computer software program [7, 8].

Despite the many benefits derived from the use of computers, CAI and multimedia technology in pre-school education, a recent study found that many teachers face many challenges in integrating information technology effectively in teaching [9]. The researchers recommend a suitable technology integration professional development model to be adopted in early childhood education. Cairncross and Mannon [3] also argued that there is growing evidence that the potential of interactive multimedia is not fully exploited. They expressed that in the design of good interactive learning applications, a user-centred approach is essential. Passig and Levin [10] conducted a research on 90 children pertaining to gender differences in learning interest with different multimedia interface designs. They found that there is a significant difference between boys and girls regarding the influence of the learning interface designs on the amount of time spent on a task as well as on their level of satisfaction with the different interfaces. A survey of the literature reveals that to design an effective multimedia learning application for pre-school children, the interface design must be user-centred, and serious consideration must be given to the learning preferences and abilities of both gender. The package must also consider the role of the teachers so that appropriate steps can be taken to manage, and monitor students’ progress to achieve the expected learning outcomes. This paper presents the design of a multimedia learning package, AlphabetStory, for pre-school children, aged between three and six years, to learn the 26 letters of the English alphabet. The instructional design model consisting of the five phases—analysis, design, development, implementation and evaluation (ADDIE Model) [11, 12]—was used to develop AlphabetStory. Each of these phases is explained below.
II. CONTENTS ANALYSIS OF ALPHABETSTORY

In Malaysia, children who attend kindergartens are generally aged between four and six years. These children come from different ethnic and cultural backgrounds, and obviously, they also have different levels of computer literacy. The contents and requirements for the package were gathered from various sources: interviewing the pre-school principal and teachers; observing classes in session to understand the teaching methods used; and observing the behaviors of the children during the learning process.

A. Interviewing Kindergarten Principal and Teachers

An interview form was designed for interviewing the principal and teachers. The interview was aimed at gathering, eliciting, and defining the requirements for the development of an alphabet learning package. The interview questions pertain to: the teaching and learning of the English alphabet; the teaching aids and techniques used; the children’s preferences, problems that teachers often encounter in teaching; and their opinions on the functions, features, and design of a computer-based learning package. One kindergarten principal and two teachers from three different kindergartens were interviewed. Each interview took 60-90 minutes. The interview outcomes on the teaching and learning environment in the kindergarten, and suggestions of the three interviewees, particularly on the use of computer in teaching, are summarised below.

Principal of Kindergarten A: Every child learns at his own pace, and has different levels of learning ability (fast or slow). Hence, a child should not be asked to learn and do too much at one time. Young children usually learn better through hands-on approach, especially, through physical encounter with their surroundings. Thus, activity- or game-based teaching is emphasised. Homework and writing are not particularly important for kindergarten children. Three to five-year-olds learn the alphabet from A to Z, and the teachers monitor their progress. Children are taught to recognise or pick the right words. Graphical contents help the children to learn and understand the lessons better. Children are not given any test or sit for any examination, but they are continuously being assessed individually to determine whether they are ready to go on to the next level. Do not underestimate the learning abilities of young children. Education must be meaningful. Do not “give” the children knowledge, instead, teach them. Computers are very common today, and children adapt to it easily. The computer class is only for six years old children, and there are not more than 14 children in a class. The class is held one hour per week, and two children share one computer. Computers are not used as a teaching aid, but children are told what the computers can do for them.

Teacher of Kindergarten A: Classes are mainly conducted in English. Children and parents are encouraged to be bilingual. Each class takes about 30-45 minutes. Children prefer to play games straightforwardly instead of going through the lessons. Teachers prefer the children to go through the lessons first before playing games. Three to four-year-old children learn A-Z in capital and small letters. Children aged five years and above sit for a short one-hour test. There is no limit on the number of questions in the test. Teacher will revise the contents over and over again until all the children pass the test. Try not to have to many restrictions in the learning process, because children have different learning abilities. Computer class is held once a week and takes 45-60 minutes. Children learn very basic computer applications. They share computers, and only use the mouse when using the computer applications. Computer is also used to teach colours and shapes.

Teacher of Kindergarten B: Classes are conducted mainly in English and Chinese except for Malay Language class. Four main subjects are taught in the kindergarten: English, Chinese, Malay Language, and Mathematics. A lesson lasts 20 minutes and there are four lessons in a week to cover all three languages and Mathematics. Three to four-year-old children learn the letters of the alphabet A-Z. Five to six-year-old children learn A-Z with words and spelling. The children aged three to four years are given tests, but minimum amount of writing is involved. There are two short examinations a year for children aged five years and six years, and these examinations are aimed at preparing them for the primary school. There is no computer class for the children.

All three interviewees commented that multimedia contents and features should be used to teach the learning of the English alphabet as they can capture the attention of children, make them to enjoy learning, understand the lessons better, and make the learning process more effective. A self-paced learning package is recommended as it can cater to children with different learning abilities. Although children like to play games immediately or answer tests/quizises, they should follow the lessons first. The system should be developed for use under the guidance of a teacher. If tests or exercises are part of the curriculum, the number of questions should be limited as children get bored easily, and they should be allowed to answer the test questions in the order they choose. Suitable background music should be provided as children love nice music, and sometimes they even sing along. The design of the learning package should include colourful graphics as children love colourful objects and pictures. Music and colourful interface design help to capture and sustain their attention, making the learning process more enjoyable. If a test is included in the learning package, it is recommended that a time limit be set so that children learn to manage time. A test should be completed within 30 minutes. Another attempt should be given if a child is unable to answer a test question. Recommended number of test questions per session is five questions for three to four-years-old children; and 10 questions for five to six-years-old children. Also, it is useful to record the time taken to complete a test as this can help the teachers to evaluate and monitor a child’s learning progress.

B. Observation of the Children’s Behaviours in Class

Class observation provides an opportunity to see the way the teachers conduct the lessons, and to note the behaviors of the children. Class observation was carried out in two classes (Class 1 and Class 2) in Kindergarten A, and took 90 minutes in all. One class had 10 children aged between two and four years, while the other class had 25 children aged between five and six years. The observations were recorded manually, and summarised below.
Observation in Class 1 (2-4 years old): The Montessori method is adopted in teaching. In this method, work and play are of equal importance, i.e., learning through activities and games. The children sat in a circle and listened to the teacher. The teacher gave instructions by speaking slowly, firmly, and clearly in English. An assistant was specially assigned to look after a special child who cannot speak. Cards with colours or shapes were used for evaluation. The child was required to say out loud the shape or the colour. The children were taught about shapes using actual objects. This was repeated several times. After the teaching session, the teacher played a game with the children. The children were first instructed to close their eyes while the teacher hid the objects of different shapes all over the classroom. Then, the children were asked to volunteer to find a specific shape (object) mentioned by the teacher. The teacher gave hints when a child could not find the shape (object). Children showed interest and followed the teacher’s instructions during the shape recognition class. Some children were able to find the shape (object) on the first attempt, while some others needed several attempts.

In the music class, the children were told stories. They were required to sit with the teachers, and sing together. The children sang and danced in a circle according to the teacher's instructions. The children were also allowed to play with different musical instruments such as the bell, tambourine, etc. Some of the children were able to follow the lessons, but some became impatient, and inattentive. The children enjoyed the music class very much. Children queued up to wash their hands before eating, and they were taught to pass the food to other children. Some children were taught to count the number of biscuits while eating.

Observation in Class 2 (5-6 years old): During the lessons, the teacher gave instructions in a firm, loud, and clear voice and tone. The children were able to follow the teacher’s instructions in English. They learned to write the letters of the English alphabet and they were taught a concept in a group. The children were asked to do the exercises in the book. They were grouped together when they were asked to read books, while the teacher marked their work. The children could recognize numbers from 1 to 9 and could pronounce them in English. In some activities, the teacher gave instructions in Malay, as a way to teach the language. She gave instructions, and asked what the specific words in her sentences meant. She then asked them to do as she had just instructed. The teacher asked some of the children to help her with some tasks such as distributing plates and cups to their classmates. The teacher used various teaching aids and activities such as flash cards, colouring activities, drawing pictures, and associating pictures with words, to reinforce what had been taught. The teachers’ handwriting on the board was large and clear, and she used large words printed on the cards. Flash cards were used to introduce words to the children. Occasionally, the teacher engaged the children in games that involved physical activities in learning. The teacher corrected the children's work individually and provided additional guidance, if required. There is more emphasis on the academic aspects, and less emphasis on playing games. They were also given homework like the primary school children. The children were disciplined and well-behaved. They enjoyed “discovering” together but it is obvious that each child has his own level of learning ability.

Based on the two observations, one of the main problems that teachers often encounter is the lack of focus among some of the children in class. They are easily distracted and become restless, and this affects the teaching and learning processes. The information gathered from the interviews and class observations were used to define the requirement specifications of the multimedia learning package of the English alphabet to be developed.

III. CONTENTS DESIGN OF ALPHABET STORY

In the contents design phase, the information gathered from the contents analysis phase was classified into learning contents and interface designs. Five main modules – Lesson, Exercise, Test, Game, and Parental Control – were developed to achieve the learning outcomes, which are to make it enjoyable for the children to learn the English alphabet, and at their own pace. In each module, there are interesting learning activities, and these, coupled with the attractive user interface design help to sustain the children’s attention in the learning process.

A. Lesson

A simple story, broken into three parts as shown in Fig. 1, was used for learning the first eight letters (letters A-H) in spring design, followed by the next eight letters (letters I-P) in winter design, and the remaining 10 letters (letters Q-Z) in a beach and sunny day design. The different designs are aimed at making it less stressful for the children to learn the alphabet.

To cater to the different learning abilities of the children aged between three and six years, three levels of learning were designed:
Level 1: Children learn the 26 letters of the alphabet only.
Level 2: Children learn the 26 letters of the alphabet with one simple object to illustrate each letter of the alphabet.
Level 3: Children learn the 26 letters of the alphabet with three simple objects to illustrate each letter of the alphabet.

A simple quiz is given as a revision on the letters learned before proceeding to the next section of the story. This is aimed at ensuring that the children are ready to proceed. To accommodate the cultural background of children from different ethnic groups, instructions are available in three languages: English, Malay, and Chinese. The children learn to read and pronounce the 26 letters of the English alphabet. The verbal instructions are simple, clear, loud, and at a speed suitable to the children. Text instructions are simple, clear, and suitable font type and large-size font are used. Each letter is illustrated using simple and colourful objects such as animals (e.g., dog, rabbit, zebra), fruits (e.g., apple, banana, grape), and common objects (e.g., cake, flower, umbrella) to teach children at level 2 and level 3.

To allow self-paced learning for different age groups, the process of learning the letters and objects can be repeated; no time limit is imposed. Teacher or parents can set the order of learning of the letters of the alphabet — in alphabetical order or in random order. This is enabled through the General Setting of the Parental Control module.

B. Exercise Pad

The children learn to write and practise writing the 26 letters of the alphabet, both in uppercase and lowercase, using a mouse or trackball on an exercise pad. AlphabetStory animates the sequence of strokes correctly and repeatedly to allow children to know the right way of writing the alphabet. Eight colours are provided (black, red, blue, green, orange, yellow, magenta, and cyan) with three choices of font size: small, medium and large for writing practice (Fig. 2). An eraser is provided to erase any wrong input. A Clear Pad button is provided to clear the writing on the exercise pad. There is no time limit for the writing practice.

C. Test

A test is given to evaluate whether the children have successfully learned and understood the 26 letters of the alphabet. There are two types of tests – Alphabets Frenzy and Words Trivia:

Alphabets Frenzy: Children are tested on the uppercase and lowercase of the 26 letters of the alphabet. This test applies to all three levels of lesson.

Words Trivia: This test is for level 2 and level 3 lessons only (children aged four years and above). In the test, the children must find a letter to match an object. At the start, a minimum of three objects are displayed on the screen, and the number is increased gradually to a maximum of six objects.

For both tests, a teacher or parent can assign a specific time limit (e.g., 10 questions within 60 seconds) as shown in Fig. 3(a). In all tests, the children will have to complete the test within this specified time limit. The instructions and questions are simple, clear, and suitable font type and font size are used. A tick or a cross is shown on the screen to indicate a correct or incorrect answer, respectively (Fig. 3(b) and Fig. 3(c)). This enhances the learning and remembering of the 26 letters of the alphabet in uppercase and lowercase. A cross is displayed on the screen at the end of the time limit for answering. These are self-paced tests, and the children can stop and exit from the test at anytime by clicking on the “End” button. The tests can be repeated (if the scores obtained are unsatisfactory), by clicking on the “Restart” button.

The test results show the percentage (the total number of correct answers out of the total number of questions), the grade, the total time spent to complete the test, the list of question answered wrongly, and the correct answers to those questions (Fig. 4(d)). The results of the two tests are displayed on the screen, and also stored in the database to monitor a child’s performance. There is no time limit for answering the questions in Alphabets Frenzy.