The Design Framework of Interactive Storybook Support Early Literacy Learning for Ethnic Minority Children.

Muneeroh Phadung, Surachai Suksakulchai, and Wacheerapan Kaewprapan

Abstract - Multimedia application as interactive storybook has advantages and capabilities for enhancing early literacy development. An interactive storybook design framework support early literacy learning for ethnic minority children is presented in this paper based on reliable literature reviews for educators to necessary understanding in four main categories including multimedia design, interface design, learning design, and cultural design. Moreover, this paper shows how they combined to provide an interactive storybook prototype development.

Index Terms - interactive storybook, multimedia application, early literacy learning, ethnic minority children, early childhood education

I. INTRODUCTION

Minority group is defined as a group that has different ethnics, cultural traditions, religious or linguistic characteristics from the majority of the population [1]. Since the past until these recently days, there are a lot of studies which claim in educational problems of minority children in many countries [2] [3] [4] [5] [6]. UNESCO realized in educational problem of ethnic minority children. Therefore, UNESCO has aimed to approach the compulsory primary education of good quality by 2015, as a part of "Education for All Goals" in the Dakar Forum [7].

For example, in Thailand, Yala, Pattani and Narathiwat are three southern border provinces that have cultural identity different from the other parts. In everyday life, eighty three percent of people in this area use the Pattani Malay language [8] that is one of the dialects which are influenced by the Malaysian language [9]. However, the official language used in schools is the Thai language.

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As a result, those ethnic minority children will face difficulty with learning content taught in schools because of their poor ability in using the Thai language. Besides this, the teaching methods are not compatible with their way of life and traditions which may cause educational problems as well [10].

Therefore, educators need to provide the alternative educational tools to solve the learning of children who tend to have problems in ethnic minority communities. They have to learn the official language as a second language more effectively with good attitudes to learning in all level of education including preschool education.

Storybook can be used to support early literacy learning and second language skills for children. Since storybook and storytelling can be used to improve children's listening, speaking, writing and reading skills [11]. In addition, Storytelling is useful for emotional and social skills which can make a good relationship not only among children but also between adult and children [12].

Besides, storybook in general, nowadays electronic storybooks are widely used for young children both at home and school [13] [14] [15]. Educators and researchers agree that multimedia software especially interactive storybook can be a powerful educational tool for promoting young children's literacy and language outcomes [16] [17] [18] [19] [20] [21]. But the study indicated that some electronic storybooks in the market are not efficient for literacy development [22]. Hence, educators must careful of using the products [23].

Furthermore, the educational materials for ethnic minority children are limited especially technology materials [4]. So it is necessary for educators to develop proper interactive storybooks that can support second language skills for ethnic minority children who become to be bilingual children. Thus, they can use their second language as the official language in school [7].

The potential and advantage of multimedia application in language learning have inspired the researchers to design the framework of interactive storybook which can support ethnic minority children have confidence to communicate with others. The key is that the children learn happily through the interesting material with achievement motivation to learn the language.

II. THE INTERACTIVE STORYBOOK DESIGN FRAMEWORK

Fig. 1. The interactive storybook design framework.

The Researchers categorize the interactive storybook design framework into four main categories (see Fig. 1). Three categories following the eBook design framework: multimedia design, interface design, and learning design [25] [26]. Furthermore, the researchers realize to cultural design category considering cultural pedagogy that assigned to the cooperative link between home and school [27].

Categories of design framework

In order to properly meet ethnic minority children's needs and expectations, the interactive storybook should reflect good internal designs that encourage early literacy learning and facilitate active learning; therefore, the design principles are collected based on reliable literature reviews. Each category includes a set of features are as follows:

A. Multimedia design

The multimedia design category adopts the guidelines as the strategies to present multimedia such as pictures, animations, text, narrations and so on as presents in the table I.

B. Interface design

The interface design category adopts the guidelines as the strategies to design the interaction between the courseware and users as presents in the table II.

C. Learning design

The learning design category adopts the guidelines as the strategies to encourage the children's literacy development as presents in the table III.

D. Cultural design

The cultural design category adopts the guidelines as the strategies to incorporate cultural themes to promote early literacy learning as presents in the table IV.

TABLE I
MULTIMEDIA DESIGN: SUMMARY OF DESIGN PRINCIPLES

No.	Design principles
1.	Using motion and sound to attract children attention. [28]
2.	Using intro animations short and interesting. [28] [33] [38]
3.	Designing interesting characters, animation and special effects that should be not distracting and child-friendly. [19] [25] [28] [29] [38] [39]
4.	Corresponding pictures and describing show together. [30]
5.	Using simple and relatively large fonts that clearly legible on the screen. [28] [38]
6.	Using the narration in conversational and age-appropriate style. [30]
7.	Using the narration is spoken in a friendly human voice and age-appropriate language. [29] [30] [38]
8.	Oral reading with text highlights of young learners can help to reduce distractibility during book reading. [33] [39]

TABLE II
INTERFACE DESIGN: SUMMARY OF DESIGN PRINCIPLES

No.	Design principles
1.	Children can control the multimedia and interact with characters. [28] [31] [41]
2.	Designing interface with consistency, standards, error prevention, flexibility and efficiency of use. [28] [31] [32] [34].
3.	Hotspot activation aligned with text and a dictionary option that allows repeated action by children. [39]
4.	Designing clickable item looks clickable and considering the distinction between clickable and non clickable items clear and meaningful. [28] [31] [34] [38]
5.	Immediate feedback showing that children's actions have had some effect. Moreover, Children need praise and positive reinforcement. [34]
6.	Providing interactivities suitable with motor skills children. Such as; One-click interfaces are easier than dragging or double clicking. [19]
7.	Touch screens are good for young children because they have difficulty targeting small objects on the screen. [34]

TABLE III
LEARNING DESIGN: SUMMARY OF DESIGN PRINCIPLES

No.	Design principles
1.	Designing literacy activities in holistic view by not separating activities of reading, writing, listening and speaking. [36] [40]
2.	Scaffolding and guidance can help children remember how to accomplish tasks. [31] [32] [34]
3.	Utilizing educational resources in bilingual builds young second language learner' cognitive flexibility and increases meta-linguistic awareness. [37] [38]
4.	Using literacy activities promote creative thinking, critical thinking and problem solving skills. [6] [33] [41]
5.	Listening to stories, it is easier to learn second language of young children. [40]
6.	The learning process should create extension activities that encourage the children's ability to tell their story and apply the new knowledge to other situation or other topics. [6] [27] [36] [43]
7.	Children should be actively participating. [6] [33]
8.	Designing literacy activities that support imagination, mental development and enhancing self-confidence of children. [34] [42]
9.	Designing literacy activities that encourage social interaction and collaborative. [6] [29] [34] [35] [38] [40] [41]
10.	Hearing words more than once in the same e-book increases the chances of vocabulary learning. [44]

TABLE IV
CULTURAL DESIGN: SUMMARY OF DESIGN PRINCIPLES

No.	Design principles
1.	Designing multimedia and interface that familiar to the children such as ethnic costumes, community values and beliefs and so on. [6] [27] [42] [43]
2.	Using contents related children's identity that have meaning for them and their lives on a personal, family, community, or national level. [6] [27] [43]
3.	Choosing topics that reflect home-school connection especially reflect children own cultures and begin to understand the culture of the language that they are learning. [5] [6] [27] [40] [42]
4.	Incorporating cultural themes to promote critical thinking such as concept and vocabulary skills and so on. [27] [43]

III. APPLICATION TO THE PROTOTYPE

This study follows the interactive storybook design framework as the guidelines to develop the prototype. The children have engaged with the persuasive multimedia learning environment. During the development of the prototype, each category had been testing with the children who were the targeted users and evaluated informally by preschool teachers. From the evaluation results, the strengths and the weaknesses of the prototype could be accessed in order to improve and enhance the prototype to fulfill the requirement of the users. Formal evaluation for the completed prototype will be conducted soon. Examples of the prototype screen are shown in Fig. 2 and 3.

Fig. 2. Content's screen design

Fig. 3. Content's screen with control bar design

IV. CONCLUSION

This paper presents how to usability design strategies based on reliable literature reviews in four main areas; multimedia design, interface design, learning design, and cultural design. Interactive storybook can be designed into educational tool for assisting teachers in educational setting to foster early literacy learning of ethnic minority children. As a conclusion, the design framework of interactive storybook has been design only a first step. We realized that it is still immature and need to be improved in the future study before it could be delivered.

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