iStoryBook: An Interactive Media Supporting Dialogic Reading for Children's Reading Comprehension

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Abstract

Given that successful reading requires the development of both basic reading skills and comprehension skills, it is important to understand how to support children in their reading comprehension skills development, in addition to providing them with the opportunities to develop the basic reading skills. According to the previous studies, dialogic reading can enhance the children's abilities to improve their reading comprehension. This study strove to develop a media application to support the improvement of children's reading comprehension by using interactive media technology. We developed the Interactive Story Book (iStoryBook) to support dialogic reading between parents and children. In order to realize it, we surveyed previous studies, extracted promising strategies, and applied them to interactive media technologies. iStoryBook provides a parent-involved children's reading process that will improve children's reading comprehension without making excessive demands. At the end of this paper, we introduce the results of in-depth interviews with experts after their use of the iStoryBook.

Keywords: Dialogic Reading, Reading Comprehension, Parent Involvement, Interactive Media

1. Introduction

The emergent literacy framework has been widely used to emphasize the importance of social interactions for young children in literacy-rich environments. With particular interest in children's early experiences at home before they begin school, scholars have devoted many research studies to the association between family (home) literacy environments and children's emergent literacy skills [13,6,14-15]. These empirical studies have shed light on the importance of providing the proper environments to support children in acquiring basic emergent literacy during early childhood.

However, given that the ultimate goal of reading is identifying the meaning or message of a text [16,5,17], emergent literacy researchers have faced criticism for having primarily focused on narrowly defined skills such as phonemic awareness, concepts of print, and alphabetic knowledge, or oral language development, mainly vocabulary [18]. Furthermore, other empirical studies have provided evidence that, as children learn to read, they simultaneously develop their ability to engage in analogical and causal reasoning; even as toddlers, children are developing certain habits of mind and ways of thinking, such as inference, which could be viewed as foundational for later reading comprehension [4,12].

Given that successful reading requires the development of both basic reading skills and comprehension skills, and the fact that even young children can develop the latter, it is important to understand how to support children in their reading comprehension skills development. Nevertheless, comprehension has often been overlooked in early reading

instruction, both as an outcome and as an instructional element [1-3]. One reason for this lack of attention to comprehension in early readers is the assumption that the development of basic language skills must precede the development of comprehension skills. However, empirical research has found that young children possess the linguistic, conceptual, and reasoning prerequisites to develop their reading comprehension skills. Therefore, as a unique and essential component of early reading instruction, sets of comprehension skills must be considered in conjunction with basic language skills [3-4].

Despite the growing interest in research on young children's reading comprehension, few studies have focused on the role that parents can play in improving reading comprehension in early childhood. Given empirical reports indicating that if children have difficulty with reading comprehension before they start school, these gaps in achievement generally remain stable during their school years and the fact that children spend most of their time with parents at home, we need more research on how to provide very young children with opportunities to learn and practice reading comprehension skills, focusing especially on the roles that parents can play in this effort. The following questions will be addressed in this review: How can we improve reading comprehension in early childhood? What does research tell us about the appropriate role(s) for parents in developing young children's reading comprehension? What new research is needed on the role of parents in promoting reading comprehension? What intervention programs can we develop that aim at helping parents implement reading comprehension instruction in their daily lives?

It is also hard to find any interactive applications or technologies that support parents in helping young children to improve their reading comprehension abilities. This study intends to develop a media application to support the improvement of children's reading comprehension, using an interactive media technology. In order to develop it, we surveyed previous studies, extracted promising strategies, and applied them to interactive media technologies. In this paper, we propose the developed reading application, called the Interactive Story Book (iStoryBook), to support parents' and children's dialogic reading. iStoryBook provides a parent-involved children's reading process to improve reading comprehension without making excessive demands. At the end of this paper, we report the results of in-depth interviews with experts after their use of iStoryBook.

2. Literature Review: Reading Comprehension and the Dialogic Reading Model

The RAND Reading Study Group has suggested that there are three elements involved in the reading comprehension process: the reader, the text, and the activity. The RAND group's model indicates that every component affects the others, so that the relationships between components are reciprocal, iterative, and interactive. Therefore, reading comprehension can be defined as the process whereby the reader interacts with the text through the act of reading within his or her socio-cultural context. Through this interaction, the reader can extract and construct the meaning of the text; therefore, reading comprehension can be understood as the consequence of this interaction, instead of as the consequence of a single activity [5].

The role of parents' involvement is significant for the improvement of children's reading comprehension, because younger children spend more time at home than children who attend elementary school and children usually start reading activities with their parents at home, at an early age. Parents can ensure a proper literacy environment for improving children's language [6-7]. Among the various contexts involving parents' providing young children with opportunities to learn to read at home, researchers have shown a particular interest in the function of shared book reading [8].

Accordingly, Lonigan and Whitehurst (1998) suggested that "at least some forms of shared reading can increase children's language skills." Their suggestion was dialogic

reading intervention, which was developed to coach parents and other adults in using strategies designed to enhance children's participation in book reading. Many empirical researchers have consistently found its positive effects on children's receptive and expressive vocabularies, and there have been many successful attempts to apply a dialogic reading model in the development of family intervention programs, particularly those aiming to support lower-socioeconomic status (SES) children and their parents.

The unique features of the dialogic reading model can be summarized as follows. First, parents use evocative techniques; they are expected to encourage their children to talk about visual materials or stories instead of placing them in a more passive listening role. In order to encourage children to talk, parents are requested to ask them "what?" questions instead of yes-or-no questions. Second, parents' feedback to the children should be maximally informative, which means that parents are expected to ask open-ended questions, follow up on children's answers with more questions, expand on what children say, help them with answers as needed, and praise and encourage the children's talk. All things considered, the principal feature of the dialogic reading model is characterized as a shift in roles; parents are expected to become active listeners and children are expected to become active storytellers [6].

Motivation is an important component that must be considered in choosing the appropriate textbooks for reading comprehension instruction. Motivated reading behavior is characterized by students' valuing and engaging in reading with greater persistence and passion, even when they face difficulty [9-10]. Researchers have found that students' actual comprehension is much higher when they read about a topic of interest, because reading motivation not only generates interest but also allows the reader to be engaged in reading [9]. Thus, motivating texts that can capture students' attention or interest should be provided to children, along with contexts that foster children's motivation to read.

Given that comprehension is an active and often collaborative process of making meaning, researchers have paid considerable attention to promoting students' engagement in discussion as one of the central methods for supporting reading comprehension, especially among younger children. One hypothesis for why discussion positively affects reading comprehension is that greater comprehension may result from the comprehension challenges that children face in explaining meaning to others or in their collaborative efforts to resolve these challenges [11]. According to Duke *et al.* (2011), effective teachers of reading comprehension tend to employ classroom discussion to help readers work together to make meaning from texts. In their study, the critical method for improving the effects of classroom discussion on reading comprehension was employing higher-order questioning during discussions, which encouraged the students to think more deeply [10].

A few studies have recently proposed a shared-book reading intervention that emphasizes improving younger children's reading comprehension skills, especially their inference skills. By using embedded inferential prompts and questions within the texts, van Kleeck (2008) expected that parents and children could engage in higher-level discussions involving explaining, summarizing, defining, evaluating, giving factual information, comparing and contrasting, anticipating, and predicting [4,12].

According to the previous literature review, we extracted several strategies to develop the supportive media application for the dialogic reading between children and their parents. Table 1 show the extracted strategies and also explains reasons to extract and expected outcomes in the developed application.

Table 1. Extracted Strategies to Develop iStoryBook

Strategy	Reasons to extract/expected function of the strategy	Expected outcomes in the developed application
Motivation	To capture children's attention or interest To help children be engaged in reading	Inducing persistence and passion for reading
Supportive Learning	To help children understand the story	Understanding the story precisely
Inference Enhancing	To encourage children to talk and think To help them think more deeply and critically	Engaging in higher-level discussions
Story Restructuring	To encourage children to make their own story To help children think more diversely	Becoming active storytellers

3. System Development: iStoryBook

According to previous theoretical studies about children's reading comprehension, we established the following strategies to develop a media application supporting dialogic reading between child and parents: motivation, supportive learning, inference enhancing, and story reconstructing.
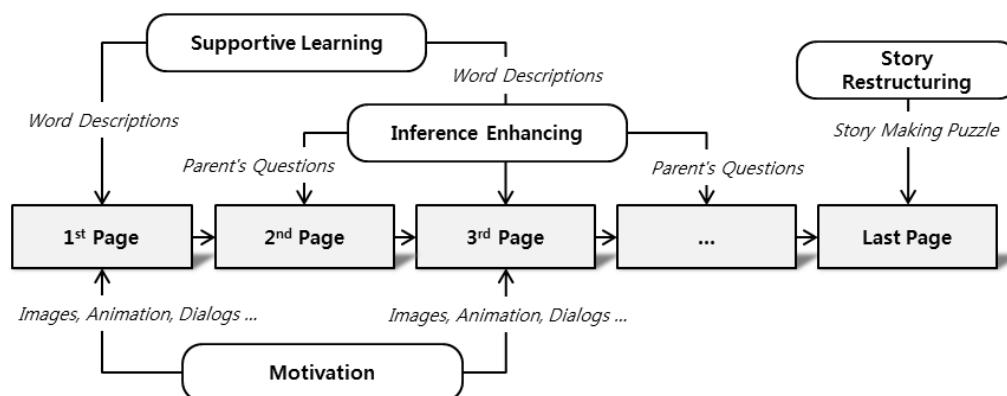

Figure 1. The Conceptual Diagram Of The Strategies Used To Develop iStoryBook[19]

Figure 1 shows the strategies of developing iStoryBook. In order to elicit students' attention to and interest in this initiative, we provided not only text but also animated images and character dialogs, which offered refreshment and amusement. For those young readers who sometimes have problems with difficult words, the proposed system provided descriptions of words when they touched them on the screen. In the middle of each reading, the system provides questions for the parents to ask the children, who can infer the next story element according to the parents' questions. At the end of each story, the system provides a story-making puzzle that calls on children to try to remember the story and reconstruct it. In this way, the proposed system contributed to successful dialogic reading.
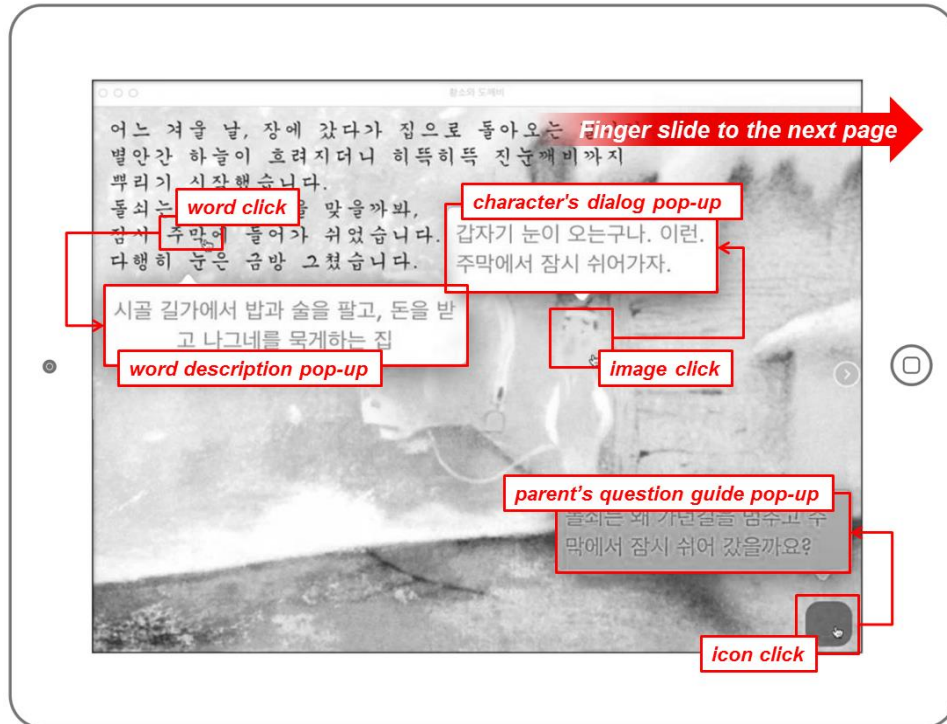
Figure 2. The Design Concepts of GUI Incorporated in iStoryBook Include Supportive Learning, Inference Enhancing, and Motivation
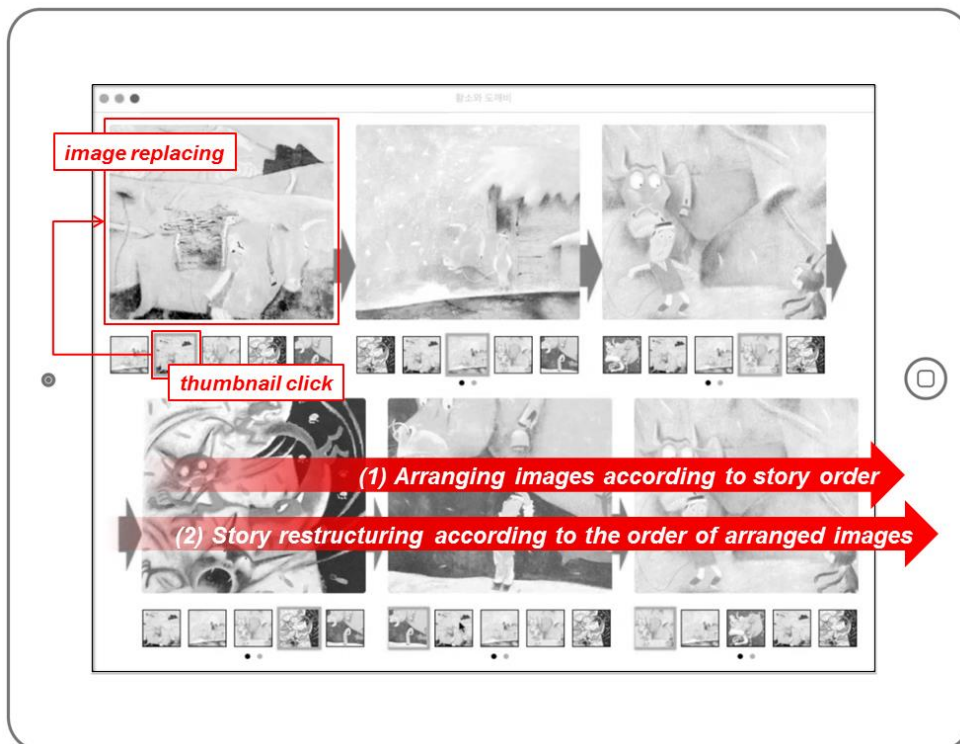

Figure 3. The Design Concepts of GUI Incorporated in iStoryBook Permit Story Reordering

Figures 2 and 3 show the concepts of the proposed media application's graphical user interface (GUI). The main purpose of the GUI is to achieve dialogic learning not only

through frequent interaction between parents and children during reading but also through the convenience of the system itself. iStoryBook provides finger-based manipulation for all reading activities, such as turning pages. In order to realize its goals, iStoryBook allows readers to click images, words, and icons to offer the appropriate information in the middle of reading, as in Figure 3. Figure 4 displays the puzzle-based interface with which users can select thumbnail images to arrange the order of images that represented each chapter of the story that they have just read. It provides puzzle-based activities for arranging images according to story order as well as the chance to restructure stories by rearranging the order of images.
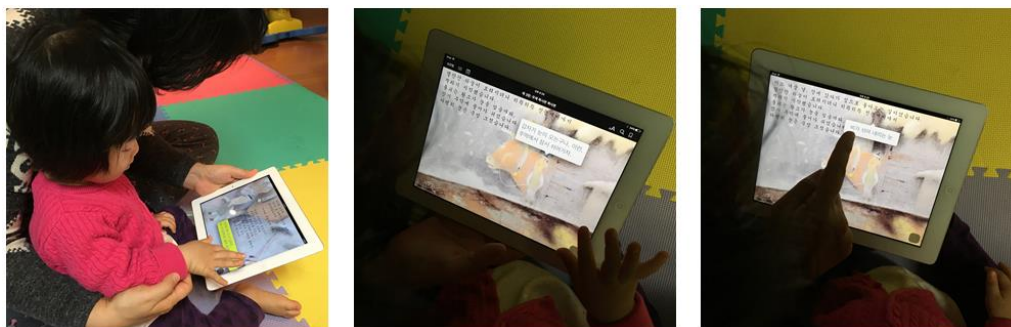

Figure 4. Photos of Dialogic Reading Using iStoryBook[19]

Figure 5. Executed Examples of iStoryBook[19]

We suggest an interactive media application supporting dialogic reading, called iStoryBook and developed through iBook Author, which provides book authoring tools for interactive reading functions. iStoryBook is a kind of electronic book that provides several functions to realize the strategies outlined above. Figure 4 contains three photos of dialogic reading between a mother and daughter using iStoryBook on an iPad, which can be easily manipulated by children's fingers. Figure 5 shows executed examples of the process: image 1 is related to motivation, image 2 to supportive learning, image 3

illustrates the context for inference enhancing, and image 4 shows the story-making puzzle for story restructuring.

4. In-Depth Interviews with Experts

In order to evaluate the feasibility of iStoryBook, we conducted in-depth interviews with six experts, all of whom were professionals in the field of early childhood education and digital media. The results of these interviews are summarized in Table 1. We asked about the effectiveness of the strategies applied in this media application. Most experts had positive opinions about using iStoryBook for dialogic reading but also offered several suggestions to improve its performance.

In terms of motivation, they suggested introducing motivation in the first stage of story through the use of multimedia animation, because that would help capture children's attention and provide an overview of the story. In the first stage of reading, teachers normally navigate the cover of books with the children to motivate the youngsters; iStoryBook's introductory multimedia animation should serve the same purpose. Additionally, iStoryBook currently provides only dialog scripts when children click on character images. It would be better if it provided not only a script but also the character's gestures or behaviors. Sound related to character dialog and background animations would be also helpful for children's motivation.

For supportive learning, more diverse media such as images, animation, and sound would be useful to help children understand complicated words more easily, because young children are more familiar with images and sounds than alphabetic text. Simple quizzes about the meaning of words on the last page of each chapter would be advantageous for re-learning. It should also be possible to link related words, meanings, and examples on the Internet.

In the experts' opinion, iStoryBook's functionality for guiding parents' questions to enhance inference skills might be an effective tool, but it should be adjustable for children's age because some of these questions are not easy for young children. Instead, playable contents like puzzle games could encourage the understanding of questions and extract children's inference more naturally. First, it is important to keep posing questions for enhancing inference, because a regular cycle of questioning, thinking, and answering could improve children's reasoning skills. Creating their own questions could be a more advanced inference-enhancing tool for the children. Experts also suggested suitable forms and subjects for questions, including the meaning of diverse words, compare and contrast, character's emotions and situations, the relationship to previous experience, *etc.*

The story-making puzzle for story restructuring was regarded as a significant innovation because it not only helps comprehension of the reading story but also allows for creation of a new story based on elements of the original account. It would be more useful if children could review what they make after story restructuring. Additionally, a greater variety of methods and game content could be applied to story restructuring. If children could participate in story-making as actors in the story, or change characters into other people, it would become an advanced story restructuring tool. In order to realize these ideas, advanced technical support for iStoryBook would definitely be needed.

Table 2. Summary of the Results of in-depth Interviews

Category	Strength and Opportunity	Weakness and Complementary
Motivation	Attention and interest	Introduce motivation earlier
Supportive Learning	Useful information	Use audio-visual, other effects
Inference Enhancing	Link to previous experience	Too difficult for child
Story Restructuring	Re-read the retold story	Should allow new story creation
Etc.	Helpful for dialogic reading	Difficulty adjustment needed

5. Conclusion and Discussion

This study intended to develop a media application to support the improvement of children's reading comprehension by using interactive media technology. We developed the Interactive Story Book (iStoryBook) to support dialogic reading between parents and children. iStoryBook provides a parent-involved children's reading process that will improve their reading comprehension without making excessive demands. The results of the in-depth interviews with experts showed that iStoryBook was certainly feasible. According to the expert's opinions, to enhance motivation would be better to use the diverse media content such as images, animation, and sound as well as visual character's gestures or behaviors related to the dialogues and sounds. And also, for supportive learning, more diverse media such as images, animation, and sound would be useful to help children understand complicated words more easily, because young children are more familiar with images and sounds than alphabetic text. Playable contents like quiz, puzzle games could not only be advantageous for re-learning but also encourage their participation to understand the story and inference more naturally. In the same manner, the story-making puzzle was regarded as a significant innovation because it not only helps comprehension of the reading story but also allows for creation of a new story based on elements of the original account. As we can see in the in-depth interviews, in order to realize the goals of advanced dialogic reading, several improvements and adjustments are needed, as outlined in Table 2.

However, some criticisms can be made of this proposed shared book reading model. First, although asking embedded questions in a text can enable parents to activate a higher level of thinking in their children that facilitates their construction of meaning, this approach is not adapted to each child's prior knowledge, which is crucial the child's motivation level. Furthermore, the children's levels of engagement or motivation to read were not considered. Second, simply asking inferential questions is not enough to instruct children to comprehend texts, because practicing comprehension skills (*i.e.*, inferential questions) does not imply the whole process of comprehension. Thus, based on these limitations, iStoryBook needs to be improved by thoughtfully considering each child's prior knowledge, level of engagement or motivation; and including wide-range of comprehension skills.

Finally, in further research, we need to apply this idea to a greater number and variety of stories and conduct larger-scale case studies to evaluate this application. And also, new media technologies can be adapted to dialogic reading such as AR (augmented reality), tangible interface, and serious game and so on.

Acknowledgments

References

[1]   K. A. D. Stahl, "Proof, practice, and promise: Comprehension strategy instruction in the primary grades", Reading Teacher, vol. 57, **(2004)**, pp. 598-610.

[2]   A. H. Paris and S. G. Paris, "Teaching narrative comprehension strategies to first graders", Cognition and Instruction, vol. 25, no. 1, **(2007)**, pp. 37-41.

[3]   A. van Kleeck, "Providing preschool foundations for later reading comprehension: The importance of and ideas for targeting inferencing in storybook sharing interventions", Psychology in the Schools, vol. 45, no. 7, **(2008)**, pp. 627-643.

[4]   P. Kendeou, J. S. Lynch, P. van den Broek, C. A. Espin, M. J. White, and K. E. Kremer, "Developing successful readers: Building early comprehension skills through television viewing and listening", Early Childhood Education Journal, vol. 33, no. 2, **(2005)**, pp. 91-98.

[5]   RAND Reading Study Group, "Reading for understanding: Toward an R&D program in reading comprehension", Santa Monica, CA: RAND, Retrieved from www.rand.org, **(2002)**.

[6]   C. J. Lonigan and G. J. Whitehurst, "Relative efficacy of a parent and teacher involvement in a shared-reading intervention for preschool children from low-income backgrounds", Early Childhood Research Quarterly, vol. 13, no. 2, **(1998)**, pp. 262-290.

[7]   J. R. Paratore, C. M. Cassano, and J. A. Schickedanz, "Supporting early (and later) literacy development at home and at school: The long view", In M. Kamil, P.D. Pearson, E. Moje, P. Afflerbach (Eds.), Handbook of reading research, , New York: Routledge, vol. 4. **(2010)**, pp. 107-130.

[8]   D. K. Dickinson and J. De Temple, "Putting parents in the picture: Maternal reports of preschoolers' literacy as a predictor of early reading", Early Childhood Research Quarterly, vol. 13, no. 2, **(1998)**. pp. 241–261.

[9]   J. Gutherie, A. Wigfield, N. M. Humenick, K. C. Perencevich, A. Taboada and A. B. Pedro, "Influences of stimulating tasks on reading motivation and comprehension", The Journal of Educational Research, vol. 99, **(2006)**, pp. 232-246.

[10]   N. K. Duke, S. L. Pearson, S. L. Strachan, and A. K. Billman, "Essential elements of fostering and teaching reading comprehension", In What Research has to Say about Reading, International Reading Association, **(2011)**, pp. 51-93.

[11]   T. Shanahan, K. Callison, C. Carriere, N. K. Duke, P. D. Pearson, C. Schatschneider, and J. Torgesen. "Improving Reading Comprehension in Kindergarten through 3rd Grade: IES Practice Guide", NCEE, **(2010)**, pp. 2010-4038.

[12]   A. van Kleeck, J. Vander, J. V. Woude, and L. Hammett, "L. Fostering literal and inferential language skills in Head Start preschoolers with language impairment using scripted book-sharing discussions", American Journal of Speech-Language Pathology, vol. 15, no. 15, **(2006)**, pp. 5-95.

[13]   A. G. Bus, M. H. van IJzendoorn, and A. D. Pellegrini, "Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy", Review of Educational Research, vol. 65, no. 1, **(1995)**, pp. 1-21.

[14]   A. D. Pellegrini, J. C. Perlmutter, L. Galda, and G. H. Brody, "Joint reading between black Head Start children and their mothers", Child Development, vol. 61, no. 2, **(1990)**, pp. 443-453.

[15]   M. Sénéchal, "Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure", Scientific Studies of Reading, vol. 10, no. 1, **(2009)**, pp. 59-87.

[16]   W. Kintsch, "The Construction-Integration model of text comprehension and its implications for instruction", Theoretical Models and Processes of Reading, vol. 5, **(2004)**, pp. 1270-1328.

[17]   P. van den Broek, P. Kendeou, K. Kremer, J. S. Lynch, J. Butler, M. J. White, and E. P. Lorch, "Assessment of comprehension abilities in young children", Children's Reading Comprehension and Assessment, **(2005)**, pp. 107-130.

[18]   J. A. Schickedanz and L. M. McGee, "The NELP report on shared story reading interventions (chapter4): Extending the story", Educational Researcher, vol. 39, **(2010)**, pp. 323-329.

[19]   S. J. Kim and Y. G. Lee. "Developing an Interactive Application Supporting Dialogic Reading for the Improvement of Children's Reading Comprehension", Advanced Science and Technology Letters, vol. 127, **(2016)**, pp. 65-69.

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