Using *Mise-en-scène* to Foster Reading Comprehension in Children E-books

Fatma Al Aamri, Stefan Greuter, Steffen P. Walz
GEElab, School of Media and Communication
RMIT University, Australia
Fatma.alaaamri@rmit.edu.au, stefan.greuter@rmit.edu.au, steffen.walz@rmit.edu.au

**ABSTRACT**
Interactive E-books have been used as a motivational tool for children to read. With their interactive and playful feature, e-books can engage, motivate, and provide an enjoyable reading experience. However, very few studies have been performed to evaluate the ability of the interactive features in e-books to support the comprehension of the text. Most of these studies have compared the effectiveness of reading from interactive e-books to reading from printed books. There is also a limited research on the design of interactive e-books that support comprehension of the text. This paper reviews the literature on the effects of reading from interactive e-books on comprehension. It follows by proposing an interactive design technique using the “mise-en-scène” expression and explains how this type of interactivity could support comprehension of the reading. The use of “mise-en-scène” is explained further in the design of a reading application named Trees of Tales that promotes fun, engagement, and comprehension of text.

**General Terms**
Design

**Keywords**
Reading comprehension, Interactive Reading Application, Trees of Tales, Children e-books, Interactivity for Comprehension, “Mise-en-scène”.

**1. INTRODUCTION**

“E-books can provide an instant library – a library where we can easily weave and search through the texts.” [15]. Obviously, the reading experience on the computer is different from reading a printed book. Researchers found in their survey that when book owners and non-book-owners were asked about their favourite reading material, both groups indicated that “technology-based materials dominate as reading choices” and that “text messages, emails, websites and reading on social networking sites” are mostly read by young people [3]. Additionally, having a computer at home can also contribute to reading achievement. Another research indicated that having a computer, a desk, books of one’s own, and access to newspapers and magazines, all have a significant relationship to reading attainment [2]. Although, there is an ongoing argument of whether it is a positive [11,12] or a negative [14] experience to read from the screen or even to use the e-readers such as the Kindle and the iPad. However, reading from the computer and from e-reader devices is becoming more commonplace.

Reading comprehension is the “essence of reading” as it is crucial to the development of reading skills and the development of the ability to obtain an education [6]. Reading comprehension has been defined as a highly active cognitive process that involves intentional and thoughtful interaction between the reader and the text to create meaning [13]. Interestingly, very few studies have been performed to evaluate the ability of the interactive features in e-books to support the comprehension of the text.

**2. READING COMPREHENSION AND E-BOOKS**
Since the introduction of e-books, researchers have investigated the effects of reading e-books on comprehension in comparison to printed books. Korat and Shamir [9] found that children of ages 3 to 5 enjoy e-books and remember more of e-books content than the printed books. Another study [7] established that children who read from e-books performed better in comprehension test than those who read from printed books.

However, other studies have found that interactive e-books do not support comprehension in comparison to printed books. De Jong and Bus [4] emphasised that printed books are more beneficial for learning than e-books. Another study by Stoeckle [18] concluded that students performing on average academically achieved significantly worse in the e-book session and the special education students did not have significant differences between the e-book and the printed book reading sessions. It should be noted that the selected e-book for the study had limited interactive features such as ‘page turning’, page-by-page drop down menu, and the ability to zoom in [18]. Most of these studies assessed comprehension by comparing interactive e-books in general to printed books. The most common methods that have been used to assess comprehension are the Post-test questions [7,8,10,18] and recently the eye-tracking technologies [19]. That could be due to the difficulty of selecting a suitable mean to measure reader’s comprehension [5].

Different types of interactivity in different e-books could have different effects on comprehension, such as offering multiple reading modes [17]. With the rapid development of technology, multiple e-book formats have become available. However, there are a few studies that concentrated on the interactive features in e-books that support comprehension. A recent pilot study [10] found that the less animation activated by children in an e-book, the better the children understood and memorised the story. It is...
therefore important to determine how the different interactive features of e-books affect a child’s comprehension of the text. E-book publishers and designers keep trying different approaches of using interactivity to enhance engagement as well as comprehension especially for educational e-books [16]. Thus, research on how interactivity can be used effectively is essential, as we need to move children away from interactive e-books that merely entertain children towards interactive e-books that educate them, whilst they entertain.

2.1 Interactivity in existing apps

Interactivity can play a significantly more important role than pure fun and enjoyment of the content. For example, interactivity could be used to ensure text comprehension, as those children should exhibit better reading skills than younger ones. A good example in this context is the iPad app series: Bartleby’s Book of Buttons1 by Monster Costume Inc. In this app, Bartleby collects buttons by solving mysteries and the reader is the actual co-investigator who helps the character to find his buttons. The pages are filled with images and buttons that can be pressed and moved according to the text to help Bartleby on his journey. Only when the quest in every page is resolved, the main button will turn green indicating its ability to be pressed, which in turn allows the reader to move to the next page. The design suggests that this technique engages children and gives them the feeling that they are playing a game more than reading a story.

Another interesting example is The Treasure Kai and the Lost Gold of Shark Island2 by Treasure Bound Books. This is an e-book of a game-based adventure story where the reader is in control of the storyline. By clicking the different treasure chests, new adventures advance the storyline. Although there is a sense of controlling the narrative of the story, the reader does not participate much in the adventures and there is limited interactivity with the main character. This kind of limited narrative control is more common in e-books for younger children. We have been finding that more control of narrative is more common in e-books for teenagers. Controlling the narrative can be engaging and helps to personalise the experience when reading the story.

A good e-book example for teenagers is the iPad app Brush of Truth3 by Story Bayou. In this e-book the reader is given a choice of direction that affects the narrative to a point where the story sometimes ends with a failure to solve the mystery. In this situation, the teenager has to read and understand the text to make an informed decision to progress the story in a meaningful way. Although this method allows manipulation of the narrative of the story, it also encourages careful reading and therefore it can be assumed that this enhances comprehension of the given storyline.

3. AN INTERACTIVE TECHNIQUE

From the research on interactive storytelling application, we propose that Interacting by building the scene of a page in the story can become a part of children interactive storybooks. “Mise-en-scene” is a French term meaning “place on stage,” and refers to all the visual elements of a theatrical production within the space provided by the stage itself, which essentially means visual theme or telling a story [1]. “Mise-en-scene” entails the set design including available props; the composition of the stage space; lighting; placement of characters etc.

The technique of setting the “mise-en-scene” is used in many storytelling applications where children act as the directors of the stories. It is hypothesized that this directorial involvement motivates children to create stories in an interactive and fun way. One example of an application that uses “mise-en-scene” is the Toontastic4 application by Launchpad Toys. This creative application for children allows the creating and sharing of a cartoon. It also allows children to choose a setting, drag characters, and move each character while recording a dialogue.

There are several positive aspects that come with using this technique of interactivity: children might take adjusting the scene as a quest that they need to achieve in order to produce a matching scene for the story. It may also be engaging and enjoyable to play and interact with the characters and create different versions of the storyline. In turn, using this technique can provide an assessment to measure a child’s understanding of the text. The designer of the interactive e-book can use the scene creation technique to build specific algorithms that connect the correct images of characters and objects to the different pages of the story. This will allow the software to evaluate whether children are setting the scene elements accurately, according to the text of the story, or inaccurately. If the child sets the scene correctly, feedback can be given, such as music and changing the colour of the Next Button from red to green, to motivate the child to keep reading and playing. If the colour of the Next Button does not change to green, the reader knows that she needs to figure out what is missing or what is wrong with the scene. In the following sections, we will use the design of a self-developed application, named Trees of Tales, to provide an example of how to integrate the “mise-en-scene” in a reading application for children.

4. MISE-EN-SCENE IN TREES OF TALES

Trees of Tales was carefully designed to be an engaging, motivating, and enjoyable reading experience. It aims at improving the reading habit amongst Arabic children. It is made enjoyable by adding interactive and playful elements that is part of the storyline and encourages comprehension of the text. Children first choose the character they are interested to read about from three existing characters; Joha, Sindbad, and Awaisha, see figure 1. When they tap on the character, they will be taken to the character’s tree. From the character’s tree, they can choose one of the stories that exist about that character. Those stories are branches in the character’s tree. Children can also create more stories about their favourite characters by tapping on the tree hole. For each story they create, a new branch appears in the tree, which will make the tree grow and flourish.

---

Implementing the “mise-en-scene” as the interactive technique, in Trees of Tales, allows the children to build the visual scene of each page. In Trees of Tales children are asked to set the scene and manage a few actions in the story such as selecting and positioning the relevant pose of the character on the scene and adjusting the emotional state of the characters in correspondence with the text. Only if the scene is set in accordance with the text, the next page of the story will unlock. The application evaluates the scene creation that a child has assembled through program code that connects the text with the images in the menu. The “mise-en-scene” interactive technique here urges children to pay more attention to the storyline. Children need to examine the text for clues on how to assemble the scene. They need to drag the correct characters and objects that are mentioned in the text. The children also have to drop them in appropriate positions such as characters walking in the ground. To this end we divided the story canvas into spaces for the sky and the ground. Children cannot drop characters, houses, or trees in the sky and cannot drop the sun, the clouds, or the stars in the ground. Feedback was also provided to children when their choice of actions was wrong. For example, the character would not stick on the canvas and return to its previous position.

Next, the Next Button turns green and a jingle is played to indicate that children can proceed to the next page. The Next Button works similarly to the buttons in Bartleby’s Book of Buttons as they change colour when children are successful in their attempts. In Trees of Tales the Next Button exists on every page but it does not turn green unless the “mise-en-scene” corresponds to the storyline. Figure 2 contains two screen shots of a story page in Trees of tales that illustrate the interaction to advance in the application.

When the next button turns green, children can press it to move to the next page or they can keep playing with the scene and add other images or arrange it differently until they are satisfied with the outcome. If they change a critical element that makes the scene contradict with the storyline, the green button will turn back to red indicating that there is something incorrect with the scene and next page will be locked again. However, children can easily change the images in the scene and add other images or rearrange the scene in a way that does not affect the storyline such as in figure 3.

In addition to the “mise-en-scene” ability, the application also allows children to create and produce several unique stories from the existing scene material. In the main menu, the children could share their stories and also read their friends’ creations. This functionality helps to maintain the interest of the young readers even after they have read all the base stories and ensure that there are new reading resources for children through the application. Originally, there are two branches in the tree indicating two different stories. When children create a new story, another branch is created in the tree and the tree grows vertically. Similar tools for managing the “mise-en-scene” in the storytelling part of the application are provided as well as range of backgrounds, characters and objects that can be placed in the scene. Children can also add their own text and create as many pages as they require to tell the new story. The more stories the children create, the more branches appear in the character’s tree and the longer the tree grows. Currently, there is no limit on the number of stories that children can create in each tree, and they can scroll up and down the tree to see all the stories. Figure 4 shows the tree pages of different characters at different stages.
5. CONCLUSION
There is a lack of research on the design of children interactive e-books that foster comprehension. In this paper we propose an interactive technique that if used in e-books for children, it could increase their comprehension of the text. This interactive technique is based on allowing children to set the “mise-en-scene” of the story. The technique was explained further in the design of our reading application, Trees of Tales. We believe that using this technique does not only engage children to read but also supports their comprehension of the text.

However, these are all claims until proven to be right or wrong. More research is required, to evaluate the effectiveness of using the “mise-en-scene” technique of interactivity in e-books for children. Trees of Tales application will provide a good example for evaluating “mise-en-scene” effectiveness. The next step will involve testing the comprehension of two groups of children reading from two versions of the application; one with “mise-en-scene” interactivity and one without it.

6. ACKNOWLEDGMENTS
My sincere thanks goes to the GEELab at RMIT University for funding the design and development of ‘Trees of Tales’ application.

7. REFERENCES