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e-Book Navigation on the iPad, Kindle, and Nook: Which is Better?

J. R. Jardina & B. Chaparro

Summary. This study investigates the usability of three touch screen e-Readers (iPad, Kindle Fire, and Nook Tablet) for basic book navigation tasks. Participants (*N* = 16) were asked to complete a series of tasks (e.g., bookmarking a page, highlighting text, etc.) on the three e-Readers, rate the difficulty of each task, satisfaction of each device, and to rank each device on a series of attributes and overall preference. Results revealed no overall "winner". Each device proved to have some strengths and weaknesses for basic e-Book navigation. The Nook was preferred more than the iPad and Kindle for its e-book menu structure, and the iPad was ranked higher than the Kindle and Nook for highlighting and making notes. The Kindle was preferred for tasks which required changing text size and text searching. Suggestions are offered for the improvement of e-Book navigation interfaces on touch screen e-Readers.

INTRODUCTION

This is a summary of the article titled "Usability of e-Readers for Book Navigation Tasks" in the Proceedings of the Human Factors of Ergonomics Society Annual Meeting in Boston, MA 2012.

More people are using e-Readers in their everyday life. E-Readers allow users to store and order many books instantly on a small mobile device. Many e-Readers are now offering new capabilities to compete with tablets including applications, the ability to listen to music, web browsing, and games. Some schools are now offering students iPads fully loaded with all their necessary textbooks (Swanson, 2011; Colgrass 2011). Furthermore, Barnes & Noble and Amazon reported more sales in 2010, which is in part due to sale of e-Reader products and accessories (Barnes & Noble Reports Fiscal 2011 Third Quarter Financial Results, 2011; Glover, 2011). Additionally, for every 100 books Amazon.com sold in 2010 115 e-Books were sold (Glover, 2011). As more schools switch to using e-Books instead of traditional text, the design and ease of use of e-Readers is paramount.

In 2011, Nielsen reported that the Kindle Fire had poor usability for web browsing. Jardina & Chaparro (2011) compared three e-Readers (iPad, Kindle 2, and Nook 1st Edition) based on the devices' e-Reading capabilities and found that most participants performed better and preferred the iPad. The three devices used in the Jardina and Chaparro (2011) study; however, were very different from one another. The iPad was a touch screen device, while the Nook and Kindle both had e-Ink screens without touch screen capabilities. It is possible that the difference in the results between the devices may have been due to the different screens (e-Ink vs. color) rather than the e-Book interface.

Purpose

The purpose of this study was to follow up on the Jardina and Chaparro (2011) study and evaluate three rival touch screen e-Readers (iPad 3, Kindle Fire, and Nook Tablet) for usability, preference, and satisfaction for book reading. All three of these e-Readers offer capabilities to read books, bookmark page(s), highlight text, and take notes.

METHOD

Participants

Sixteen (9 females and 7 males) university students participated in this study for course credits. Participants' ages ranged from 18 to 29 (*M* = 21.6; *SD* = 3.0). 12 of the participants were right-handed, 3 were left-handed, and 1 was ambidextrous. All of the participants were novice e-Reader users. All data was collected in the Spring of 2012.

Materials

Three e-Readers were evaluated in this study, an iPad (using the iBook application to view e-Books), Kindle Fire, and Nook Tablet. See Figure 1 for a picture of each device and Table 1 for device dimensions.

Table 1. The touchable dimensions of the three e-Readers (in mm).

	iPad	Nook Tablet	Kindle Fire
Dimensions (Height x Width)	199 x 155	155 x 91	155 x 91

Fig

Figure 1. The three e-Readers used in this study (left to right): iPad, Nook Tablet, and Kindle Fire.

All e-Readers were utilized by participants in portrait mode. A web camera and Morae (version 3.2) were used to record the interactions with the e-Readers for each task.

Procedure

Participants completed 10 tasks on each of the three e-Readers. The presentation order of the three e-Readers and the user tasks were counterbalanced across participants to control for order effects (See Table 2 for tasks and task descriptions). Task success (whether or not a participant successfully completed a task) was recorded. Participants were allowed up to two minutes to complete each task. After each task, participants were asked to rate the difficulty of the task on a 5-point Likert scale (1 = very easy, 5 = very difficult).

Table 2. Task Descriptions.

Task	Task Description
Add Bookmark	Add a bookmark to the page
Change Text Size	Change the size of the text
Delete Bookmark	Delete the bookmark
Get to Page	Find a certain page within the book
Highlight	Highlight a sentence
Locate Bookmark	Find the bookmark made previously
Note	Make a note on the first sentence
Open Book	Open the book
Search	Find a certain sentence within the book
Turn Page	Turn pages ahead

After completing all the tasks on one e-Reader, the participants were asked to complete a satisfaction survey (adapted SUS from Brooke, 1996). Once the participants completed all the tasks and the questionnaire for each e-Reader, they were asked to rank their preferences of eight different attributes (e.g., highlighting, bookmark, notes, screen glare, menu structure, screen size, search, and text legibility) as well as their overall preference. The presentation of the eight attributes was randomized across participants.

RESULTS

Task Success

Successful and unsuccessful completion of each task was recorded for each participant for each device. All participants were able to successfully complete four tasks (“Change Text Size”, “Delete Bookmark”, “Open Book”, and “Turn Page”) on all the e-Readers, and the “Add Bookmark” task on the iPad. Figure 2 shows the frequency of success for the remaining task on each device.

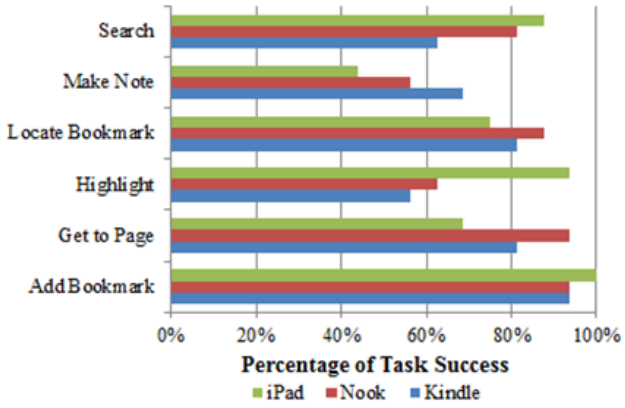

Figure 2. Frequency of completion for each task on each device (*N* = 16).

Task Difficulty

Repeated-measures ANOVAs were conducted to investigate differences in perceived difficulty for each task across the devices. The tasks with significant perceived difficulty ratings between the devices were the "Locate Bookmark" and "Get to Page" tasks. The "Get to Page" task was less difficult on the Nook than on the iPad and the Kindle, and the "Locate Bookmark" task was easier on the Kindle and Nook than on the iPad. There were no significant differences between the perceived difficulty of the other tasks between the devices. See Figure 3 for average task difficulty ratings.

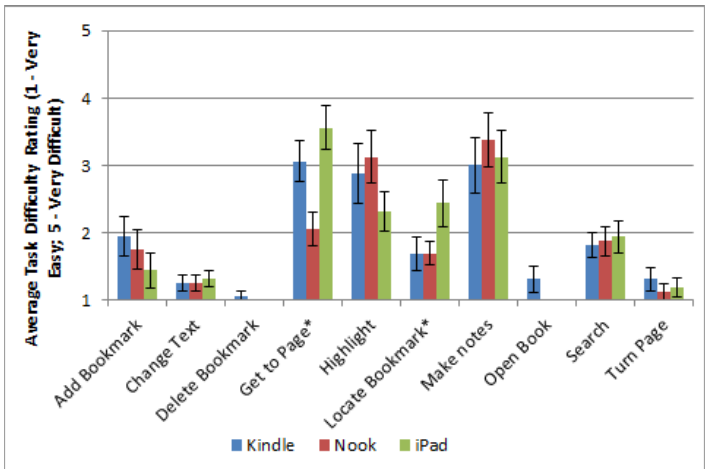

Figure 3. Average task difficulty rating per task on each device (*N* = 16). Note: Error bars represent +/- standard error. *= indicates significant differences between devices.

Satisfaction

An adapted version of the System Usability Scale (SUS) was used to gather an overall satisfaction rating, which ranges from 0 to 100. A higher number indicated a greater level of satisfaction with the e-Reader. A repeated-measures ANOVA revealed that there was not a significant difference in total satisfaction scores. The Kindle Fire had a mean SUS score of 64.2 (*SD* = 18.9), the Nook Tablet had a mean score of 66.7 (*SD* = 19.7), and the iPad had a mean score of 71.4 (*SD* = 18.5).

Preference

Participants were asked to rank their preferences of the devices along eight different attributes and their overall preference. Results from a chi square analysis showed that the Nook was chosen as the best device overall more (10 out of 16) than the other two devices. A Friedman's test was run on the attributes and significant results were found for menu structure, highlighting, and notes. The Nook was ranked higher than the iPad and Kindle on menu structure, and the iPad was ranked higher than the Kindle and Nook on highlighting and notes. No other

significant differences were found.

DISCUSSION

In the Jardina and Chaparro (2011) study comparing the iPad to the e-ink Nook and Kindle, the iPad was the overwhelming winner among the e-Readers. This study yielded no clear winner. In fact, no differences were found between the devices on satisfaction, perceived workload and preferences on different attributes. It is interesting to note that none of the e-Readers had a very high satisfaction score, which means that each e-Reader has room for improvement.

Nook Tablet

Positive. The Nook tablet's menu structure was more preferred than the Kindle Fire and iPad's menu structure. Participants liked that the menu had a lot of options and that the icons were clearly labeled. They also reported that the menu was very easy to use and liked that it was all in one place at the bottom of the screen, unlike the iPad that was split (see Figure 4).

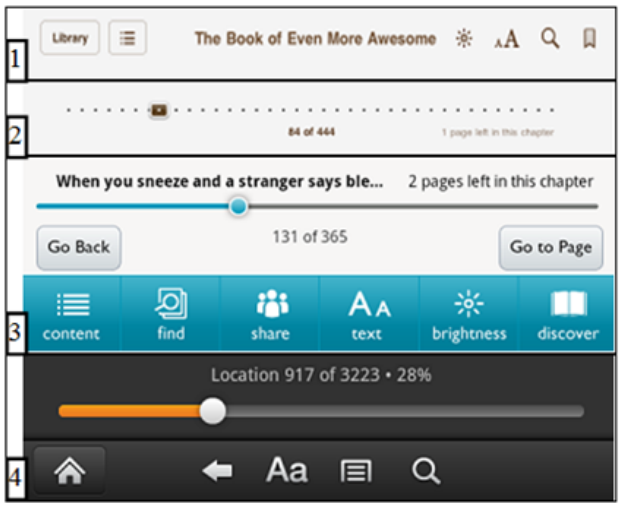

Figure 4. The menus of the three devices (top to bottom): iPad (1, top menu), iPad (2, bottom menu), Nook Tablet (3), Kindle Fire (4).

Participants reported that the "Get to Page" task was easier on the Nook than on the Kindle and iPad. This may be due to the helpful "Go to Page" button directly on the menu of the Nook (see Figure 7). When this option is chosen, a dialogue appears that allows the user to type in the desired page number and takes the user directly to that page. The iPad does not have this feature and the Kindle has it hidden in a submenu.

Improvements. The Nook took a considerable amount of time to find the text after the text was entered, but this was not true for the iPad or Kindle. Indeed, many participants said the amount of time it took the device to find the text was too long, and caused them to rate it lower in preference for searching.

Kindle Fire

Positive. Both the Kindle and Nook were rated lower on task difficulty for the "Locate Bookmark" task than the iPad. More participants were able to complete this task successfully on the Kindle and Nook than were able on the iPad. Some participants said the location where the bookmarks were listed was easier to find on the Kindle and Nook than it was on the iPad. As seen in Figure 5, the Kindle has bookmarks listed directly on the contents menu and the Nook has well-defined tabs that contain bookmarks. The iPad has a bookmark section in its content menu, but was often overlooked by participants.

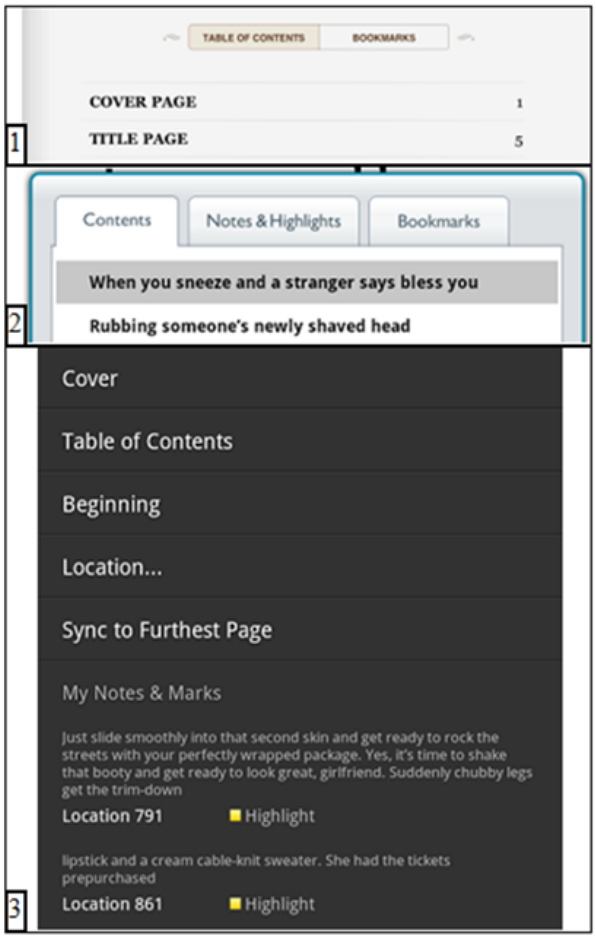

Figure 5. The contents where the bookmarks were listed on the three devices (top to bottom): iPad (1), Nook Tablet (2), Kindle Fire (3).

Participants were able to complete the "Change Text Size" task faster on Kindle than on the iPad. The icon to change text size on both devices looked very similar, but the actions required varied between the devices (see Figure 6). On the Kindle, the current text size was highlighted, so tapping on another size changed the text size. On the iPad tapping on the larger "A" made the text bigger and vice versa. Although all participants eventually figured out how to change the text on the devices, they played with the iPad's settings a little longer and therefore completed the "Change Text Size" task faster on the Kindle. Perhaps having all the text sizes lined up in a row made it easier for participants to know they were changing the text size on the Kindle.

Fig

Figure 6. The change text menu on the two devices (top to bottom): iPad (1), Kindle Fire (2).

Searching for text was faster on the Kindle than on the Nook. A few participants commented that they liked how there was a progress bar when searching on the Kindle, as opposed to the ticking circle on the Nook and iPad. The progress bar allowed participants to know approximately how close the device was to finding the text whereas the iPad and Nook did not offer this feature.

Improvements. Many participants disliked the lack of options on the Kindle's menu structure, and therefore found it more difficult to use than the Nook (see Figure 3). Taking some of the options out of the contents menu (see Figure 5), like the location finder, and putting it in the main menu may make the Kindle easier to use. Adding descriptions to the already existing icons within the menu may also help in making the menu structure easier to use. For instance, adding "Text" under the text icon and "Search" under the search icon. Also, participants felt the location slider, which allows users to go to a certain location within the book, was too sensitive and difficult to

use.

iPad

Positive. Overall, participants preferred to highlight and make notes on the iPad more than the Kindle and the Nook. Also, participants w ere faster at highlighting on the iPad than on the Nook. Some participants had difficulty highlighting a w hole sentence on the Nook because highlighting w as unidirectional. For example, if a participant tapped the middle of a target sentence to begin highlighting on the iPad they could move the highlighting bars to the beginning and end of the sentence, but could not do the same on the Nook (see Figure 7). It is interesting that participants preferred to make notes on the iPad more than the other tw o e-Readers, especially since more participants w ere able to successfully complete the "Make Notes" task on the Kindle and Nook (see Figure 2).

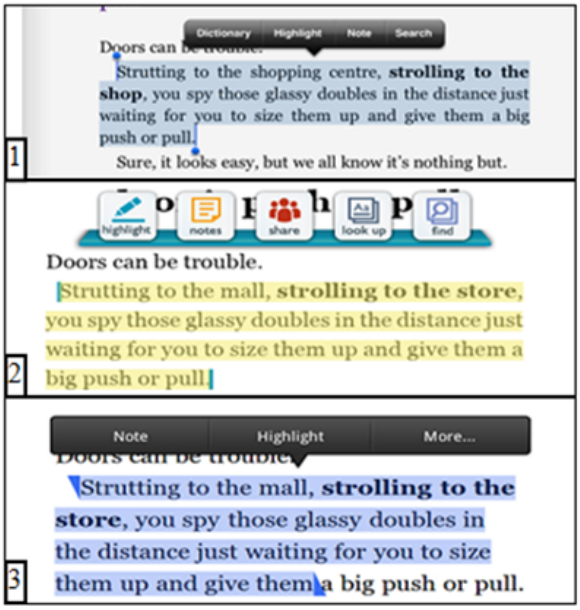

Figure 7. Highlighting on the devices (top to bottom): iPad (1), Nook Tablet, (2), and Kindle Fire (3).

Improvements. The iPad, unlike the Kindle and the Nook, does not have an option to go to a particular page in a book. Adding this ability is necessary in helping users locate a particular page faster and w ith less difficulty.

Many participants remarked that they did not like the split menu of the iPad. Part of the menu w as at the top of the screen, but the ability to scroll through pages w as at the bottom of the screen (see Figure 5). They said that having all the menu options in one place like the other devices helped them to find everything and made it easy to use.

CONCLUSIONS

The aim of this study w as to assess the usability, satisfaction, and preference of three touch screen e-Readers. The book used in this study w as a leisure reading book, therefore the results of this study may not be comparable to e-Textbook reading or how students may use a book to study for class. Since schools are now offering students an e-Textbook option for their classes (Sw anson, 2011; Colgrass 2011), the w ay students use these new books on their mobile devices is something that needs to be studied further. Future studies should examine e-Textbook reading to see how students navigate through e-Textbooks and use them for class and studying purposes.

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