

Demystifying the User Experience of K-5 Students with a Digital Book Application

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Abstract:

Digital technologies have over the past few decades brought significant changes to the learning tools that are available to teachers and students. One of the reading interventions that has contributed in enhancing the reading ability of elementary school students is known as myON. This intervention helps students to easily identify books that they can use for independent reading. The primary aim of this study was to comprehend how elementary school students can obtain and use the digital book libraries through usability research. Further, this study was critical in helping to improve understanding on how myON can help students find relevant information about a book as well as their experiences while using myON website. Research findings indicated that approximately 97% of the participants showed success in task completion. This implies that the website was effective in enabling participants to successfully complete their tasks. Further, it was observed that the overall satisfaction score was above average, meaning that majority of the participants were satisfied with the website and its operations. There was a common consensus among the participants that myON was effective in enabling students to read a wide range of books online.

Introduction

The internet is widely used by students for academic purposes globally. With advancement in technology, it has become easier for students to employ the use of the internet as a research tool compared to the early years when the internet was only used for scientific research and military purposes (Syed, 2017). The internet has made significant progress to become the main tool of communication that is relied upon by everyone to convey various types of information (Radich, 2013). Despite the significant progress made in the expansion and access of the internet, there exists some negative aspects of internet use. For instance, there is limited regulation on the information that is published on the internet. In addition, information can be published over the internet by anyone, thus it can lead to the publication of biased and unreliable information which can be accessed by internet visitors (McDowell, Lytle & Rafail, 2016). Usability evaluation is critical as it emphasizes on how users can obtain and use a product to achieve their goals. Moreover, it can be used to describe the satisfaction of operators using the route. This paper sought to outline the various ways that can be used to enhance usability of digital book application to clients.

Background

Digital technologies have over the past few years dramatically changed the learning tools used by students and their teachers. The available evidence indicates that since 2007, there has been a significant increase in the number of applications and devices used for presenting digital book libraries (Biancarosa & Griffiths, 2012). The establishment of the digital reading programs was aimed at meeting the diverse learning needs and abilities of students. This is a critical aspect of successful reading programs. In the modern elementary classrooms, children possess diverse abilities. For example, some children know how to read upon entering the first grade while others do not have the basic pre-reading skills. For some children, English is not

their first language, while others may suffer from learning disabilities. To address all these needs, digital reading programs have been developed to promote personalized reading. The development of the digital reading programs took into consideration the variation in students and consequently ensured that all students have access to resources that align with their level of ability (Brekhus, 2011).

One of the key objectives of user experience (UX) research is to help identify the needs as well as expectations of users and to explore their interaction with the systems (Demir et al., 2017). Usability testing is a technique that helps determine the interaction of users with the product by collecting data on effectiveness, efficiency, the success rate of task completion, time taken to complete pre-defined tasks, and user satisfaction with the product (Demir, Karakaya & Tosun, 2012). Usability testing also helps in understanding how elementary school students can obtain and use the digital book libraries. As such, this involves understanding how students employ the use of digital technologies to search for important information about a book and their experiences while using the technologies. The rapid advancement in technology and the introduction of digital learning platforms have brought about numerous advantages that will be outlined in this review.

Digital book library

Digital book libraries have made significant contribution in the development of early reading skills in children. Moreover, the digital book libraries enable the students with visual impairments or language-based disabilities to easily access reading materials. The ease with which these groups of children are able to read is promoted by the use of text-to-speech feature. Synchronized highlighting of texts helps in drawing the attention of students to some important words (Biancarosa & Griffiths, 2012). The digital reading tools provide students with practice opportunities and individualized feedback; which is critical to improving their reading skills.

Digital reading program (myON)

Digital technologies and interactive media have continued to enhance learning in children (Radich, 2013). Basic applications that are available in digital platforms such as text-to-speech features and the use of internet for collaborative learning have contributed in improving the learning experience of many children. myON program is one of the key reading interventions that has helped to improve the reading ability of elementary school students. MyON facilitates the identification of the Zone of Proximal Development (ZPD) and it also suggests the most appropriate books that can be used by elementary school students for independent reading. Further, myON helps to enhance reading skills and comprehension, and it motivates students through extrinsic rewards (Brekhus, 2011).

Usability Evaluation of myON

Usability tests are critical to evaluating the ease with which students are able to access and utilize digital libraries to enhance their reading. Prior to using myON, students are required to take the Lexile Placement Exam and Interest Inventory. The lexile score obtained helps the program to determine the books that are most suited to meet the interest and proficiency of the student (MyON, 2018).

Another critical feature of myON is that it is capable of providing valuable data regarding the number of books that an individual has opened and read, the amount of time spent reading, the quizzes taken and progress made in reading. myON has a plan that can be used to enhance student achievement as well as growth in reading. The usability tests serve to evaluate the ease or difficulty with which elementary school students are able to find a book or information about a book using myON. The usability tests help to assess the experiences of students following their interaction with myON website. myON provides quality digital books that contain multimedia supports, active reading tools, news articles, as well as real-time assessments for students.

This project focused on establishing a proper understanding about the usage and compliance of students with myON. The myON usability tests were used to evaluate the effectiveness and efficiency of myON and the satisfaction obtained by users by using the myON website. The information obtained would be used to improve the website. It is critical for the school administration and teachers to devise instructional decisions that can be used to promote growth in student learning.

The usability study was designed to determine interaction of users with regards to three key aspects; effectiveness, efficiency, and subjective satisfaction. In order to obtain the usability data, a set of tasks were given to the users. Data was then obtained on the ability of users to find a book using the application. Participants were also given a post-questionnaire and a SUS survey in order to gather quantitative data on the satisfaction of the participants with myON (Brook, 1986). The usability tests helped to identify the concerns of the participants and to obtain recommendations that would be used to improve the design of myON in order to make it more user friendly. The key questions that were developed and which helped to guide the evaluation included:

1. How effectively do participants complete predefined tasks on myON?
2. How efficiently do participants complete the predefined tasks on myON?
3. What is the satisfaction level of the users with the myON?

4. What is the difference in effectiveness and efficiency rates between the experienced and non-experienced myON users?

Method

The methodology used for this study was both qualitative and quantitative in nature. A mixed method was used so as to help understand more about the effectiveness and efficiency of myON, and the satisfaction of participants with myON website. The mixed method would also help in obtaining critical information that would be used to improve myON website where necessary.

A moderated-in-person usability study was carried out so as to evaluate how participants interacted with myON website. This was important in understanding the relevance and accuracy of information contained in the website. The ten elementary students were each given a set of pre-defined tasks in order to determine the effectiveness of the website tools. The interview session with each participant lasted approximately 45-90 minutes. This time was adequate to gather all the necessary information. The time was also not too much so as to create disinterest among the participants.

Interview method was used because it is widely acknowledged as one of the best methods that can be used to obtain first class data that has no interferences (Erickson, 1986). The participants were then asked post-test questions with the aim of obtaining qualitative feedback on myON. Finally, the users were taken through a SUS survey and a semi-structured interview, which took approximately five minutes each. The two approaches were used to collect qualitative data on the satisfaction of participants with myON.

1.1 Pre-Defined Tasks

Task 1: I want you to discover the MyON website before we start and tell me about this website.

Task 2: I want you to login to MyON using your username (..) and password (12...).

Task 3: You are now on the MyON page, search for “Big Dinosaurs” book to read.

Task 4: You need to read, “ What if there were No Bees” and rate the book. How would you do this?

Task 5: You need to read “Space Leftover” book and share your thoughts about the book. How would you do this?

Task 6: Search for a 3rd book to read under the “Because I Like Seasons and Weather”.

Task 7: whether “Once Upon a Time” book is in the Teacher Recommend for you to read.

Task 8: You need to open a new book from books recently opened. How would you do this?

Task 9: You need to know how much time you spent reading. How would you do this?

Task 10: You need to read “Motion” book and take a quiz. How would you do this?

Results

In order to obtain sufficient data and information that would be facilitate the development of a proper conclusion, the study involved 10 students (seven males and three female) who consented to participate in the usability tests and survey. Five of the participants were familiar with myON, while the other five were novices. Four of the participants were in the fourth grade while six were in fifth grade. Six participants were aged 11 or 12 years while four were aged nine or ten years.

1.1 Effectiveness – Task Completion Success Rates

The rate of success in carrying out tasks using a website determines the effectiveness of a website. There were 10 participants with each participant involved in 10 tasks. Therefore, there were approximately 10 tasks, in general, to be completed by the participants. 9 out of the 10 tasks were completed effectively, resulting in a 97% task success rate. The 97% completion rate of the tasks indicates that the website was effective in enabling the participants to complete their tasks. However, the average time to complete all the tasks for participants with experience was 100%, and the average time to complete all the tasks for participants without experience was 94%. It can be noted that three participants without experience were not able to complete task 6 which required them to search for the 3rd book to read under the ‘Because I like Seasons and Weather’. It was observed that even some of the participants who had experience on how to use myON found it challenging to complete the task at the beginning. All the other tasks except task 6 experienced a 100% completion rate.

2.1 Efficiency – Task Completion Time

The efficiency of a website is determined by the amount of time taken to complete a given task. The average time to complete all the tasks for participants with experience was 29 minutes and 14 seconds, and the average time to complete all the tasks for participants without experience was 37 minutes and 58 seconds. Further, it can be observed that the time period between the longest and the shortest task for participants with

experience was 7 minutes and 45 seconds, and the time period between the longest and the shortest task for participants without experience was 7 minutes and 45 seconds. The average time is taken to complete each task ranged between 24 seconds to 8 minutes and 09 seconds. In addition, the participant 9 was the fastest in completed all the tasks while participant 6 was the slowest, registering a time of 44 minutes and 59 seconds. From this, it can be concluded that participant 9 was more efficient in using the website. All the participants were completed task 8 below 1-minute and participant 6 was completed the task in 4 minutes and 20 seconds. Finally, task 6 was fairly difficult for 3 participants due to the fact they take a long time to complete the task, but the rest of the participants were able to complete the task below the average time of 7 minutes and 41 seconds.

3.1 *The difference in experienced and non-experienced users in terms of effectiveness and efficiency*

3.1.1 *Effectiveness*

The difference in effectiveness between the two participants groups was based on the success rates of completing tasks using myON. The experienced users were effective in using myON, with all the participants having 100% completion rate. On the other hand, the non-experienced users demonstrated 94% completion rate of the tasks.

Despite the failure of a few of the non-experienced users (3 users) to effectively complete their tasks, the high completion rate in the two groups illustrates that the application was effective in enabling the participants to complete tasks.

3.1.2 *Efficiency*

The efficiency was determined by the amount of time taken to complete a given task. The difference between the two participant groups was observed in the average time taken to complete all the tasks. The average time used by the experienced users was 29 minutes and 14 seconds, while the non-experienced users took 37 minutes and 58 seconds.

However, the two groups of participants had a similarity in the time period between the longest and the shortest task at 7 minutes and 45 seconds.

3.1.3 *User Satisfaction Survey Results*

For this usability test, we obtained the user satisfaction using the standard SUS survey. The outcome of the survey indicated that the mean SUS score for this usability test was 77.3 which is higher than 68. The overall SUS score was above average, this score indicates that the majority of the participants were satisfied with the website in enabling them to complete their tasks.

3.1.4 *Interview Results*

In order to get more information and data from the participants to test the website. Post-test questions were conducted to understand the user's experiences, how they felt about the website and to certain aspects not covered in the tasks questions. All the participants agreed that the website was fun, easy and good for kids to read the different book online. 6 out of 10 participants found that task number 6 was the most difficult task, which 3 of them failure to complete it. However, 4 participants found that task number 3 was the easiest task and that because the navigation was clear and easy to use. One of the participants claimed that "I don't know why... when I used the search engine to search for a book to read, it does not come first", and because of that most of participants took a long time tried to found a book.

Discussion

The outcome of this study shows that the participants found some of the tasks to be confusing. As a result, various participants did not complete their tasks successfully. For example, three of the users were not able to complete task six effectively. The participants felt that myON was not well designed. The users were required to click on the library navigation tab that directed them to the library page. Thereafter, the participants were required to scroll to the end of the page in order to see the 'Because I like Navigation' tab which contained a drop down menu. It was observed that some of the participants who were experienced with myON found this task challenging at the start, but were able to eventually complete it. Given the challenge faced by the participants in navigating through the library page, there is need to redesign the search engines in the website and substitute it with a drop-down menu. This will allow for all the essential features to be visible at the top of the page and thus minimize the problems encountered in navigating through the pages.

This study provides significant evidence showing that there is need for the redesign and improvement of the myON website. One of the evidence can be linked to the fact that it took a long time for the participants to locate a book using myON. For instance, it took one of the participants approximately eight minutes longer than other participants to complete the task of finding a book. The participant in this case required more assistance on

how to use the website. It is therefore recommended that the website's home page should be redesigned in order to make it more clear and easy for users to find the navigation tab. Moreover, in order to eliminate the challenge faced by users in scrolling down the page in order to find the scroll down menu, there is need to ensure the visibility of all the important features at the top of the page. This will make it easy for the users to navigate through the pages.

Ten of the participants were found to have split-attention that affected the search process as they completed their tasks. This occurred when the participants were forced to split their attention between various navigations that had similar link information. The key recommendation that can be adopted in order to avoid the split-attention effect is the need to change and redesign one of the search engines to ensure that it has a drop-down menu. This will make it easy for the students to search and locate all the books contained in the database. As such, the students will have no problem finding the books that they need.

It was also suggested by some of the participants that if the timer could be initiated when the users began reading their books, they would be able to know the amount of time spent reading a book. It is therefore necessary to include and activate this feature in myON so as to enable the users monitor the time they spend on reading a given book.

This study was able to determine the difference in the effectiveness with which the experienced and the non-experienced users were able to complete their tasks using myON. The participants who had prior experience with myON were able to complete their tasks successfully. The participants who did not have experience with myON were reported to successfully complete an average of 94% of the tasks. Even though completing 94% of the tasks is considered to be significantly high, there is need for first time users to gain more experience with myON so as to increase their success rates. As outlined earlier, some of the key issues associated with the lack of effectiveness among the non-experienced users include design problems, mislabelling, and navigation issues.

The efficiency rates showed that the experienced participants were able to complete their tasks by spending less time compared to the non-experienced participants. This served to indicate that the non-experienced users require more assistance in understanding the structure of the site and how to efficiently use the website. Further, it was observed that the overall SUS score was above average. The above average score indicated that more than half of the participants were contented with the website in facilitating their ability to complete their tasks. However, the score was not perfect and this illustrates the need for further modification and improvement of the website, which has been highlighted in the recommendations. The findings from this study also showed that the average learnability was approximately 57.5%. This indicates that the participants were not fully knowledgeable on how to use the website. As such, majority of the participants still needed to be guided on how to use the website.

Conclusion

myON is a form of digital library that has been developed to meet the requirements of the individual learners. myON provided all the essential information needed by parents and teachers to monitor and assess the progress of students as they read. The usability evaluation contained in the website is critical in determining the usability and effectiveness of the services offered by the website.

This study has evaluated the efficiency, effectiveness, and satisfaction of participants in employing the use of myON to complete various tasks. The methods used in the evaluation process include semi-structured interviews, observation by researchers, and usability scale satisfaction survey.

The outcome of the efficiency evaluation showed that the average time used to complete all the tasks by the participants with prior experience was approximately 29 minutes and 14 seconds. The participants without experience on the other hand spent an average of 37 minutes and 58 seconds to complete their tasks. The ability of the users to effectively and successfully complete their tasks was influenced by the split-attention effect in the search engine. The split-attention effect occurred when the participants were required to divide their attention between the various navigations that had similar link information.

Further, the effectiveness rate in using myON showed that 100% of the participants with experience were able to effectively complete their tasks. Approximately 94% of the participants without experience were able to complete their tasks effectively. Three participants without experience found difficulty-completing task six that required them to find a book to read under the section 'Because I like Seasons and Weather'. It was also observed that some of the participants with experience on how to use myON faced difficulty in completing tasks at the beginning. Apart from task six, all the other tasks reported 100% completion rate. The average SUS score was approximately 77.3, which was above the overall average of 68. This illustrated that a large number of the participants were satisfied with how the website enabled them to finish their tasks.

There was a common consensus among all the participants that myON was easy and fun to use, and that it was suitable for students who had difficulty in reading books online. There was no significant difference

in the usability scores between the two groups with regards to effectiveness, efficiency, and satisfaction with myON.

For future research, it is recommended that eye-tracking device should be used to assess the way in which users interact with myON. This is due to the fact that the eye-tracking device provides accurate data that can aid in identifying where users are looking and the amount of time spent in specific areas on the screen.

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