EDUACTIV8

MOBILE

Usability Test Report

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Executive Summary

This article states the finding of a usability test performed on EduActiv8. EduActiv8 is an application that has two modes but the focus of this article was on the reading portion. The usability test took place in Durham County Library in partnership with Hillandale Elementary School. The results primarily focused on qualitative data from children in grades second through fifth. The data centered on discerning if the content and activities dispelled throughout the application was easily understandable by the applications of primary stakeholder - children. To gain significant information researchers verbally asked five preliminary questions and five follow up questions. The questions were orally disseminated as a way to limit confusion amongst the participants as they are young school-aged children. Significant issues found after conducting the usability test was focused around layout, navigation, and context. Problems with the layout stemmed from buttons being too close together, and simply not utilizing screen space strategically. Navigation was problematic because the only way to migrate around the application was the back button. This design solution is not optimal for this interface in that it does not provide the flexibility a user needs to be able to effectively interact with the interface. One back button can almost certainly ensure cognitive barrier issues as it can cause the user to perform more steps than necessary. Lastly, the context was a significant issue in that the lack thereof confused respondents because they consistently did not know what to do at certain points during their usability test. The research team suggests that developers should add a fixed navigation bar, instructions for every activity, and a more aesthetically pleasing design.

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Purpose/Introduction

EduActiv8 is an interactive learning application that was primarily created to give kids an experience of viewing their native language, especially those with little exposure, in modern-day technology. Currently, there are two versions of the application which focuses on different curriculums: math and science, and language arts. Our usability testing centered around the latter. Each version of the application involves different mini-games and lessons that users can partake in to learn more about the subject matter. In this case, as the application is based on language arts, the games focus on spelling and word identification to further enhance users' reading comprehension. For example, there is a game titled "Word Builders" where users use letter building blocks to spell the word of the image displayed on the screen. The games feature different levels (one through five) that further test the skills of the users. Each level increases the difficulty of the games, typically by introducing more complex, longer words.

Although EduActiv8 is marketed as a learning application due to its principal features, as aforementioned, its primary focus is to expose children to their native language in contemporary technology: applications available on phone and tablet devices. Previously, EduActiv8 was solely web-based software but since this has its complications, it has been transformed into a mobile application to become more accessible to its primary audience. This is where our usability testing comes into fruition. We conducted this study to view how it would perform with its target audience which in turn permitted us to find any shortcomings if any, the application has. The results from those sessions could then allow for the designers to implement changes to the application to create a seamless, enticing experience if need be. Our primary focus of the usability test was to analyze the key features of the application. In this case, those features involved games and menus. We measured the efficiency of the application by focusing on

particular aspects of the above-mentioned features: screen optimization, navigation, and instructions. Through a focus on those elements, observations were able to be made about the perceived success of the application which was our main objective for testing. Other essential objectives of our testing included the completion rate of tasks, time constraints, and discovering potential challenging areas.

Method

The methodology selected for this study was qualitative; cohesively using elements of market research, quantitative studies, and ethnographic data collection. The use of a qualitative method was chosen because it was the most appropriate method to use with this interface design. It was used to calculate reactions and reasons as to why certain actions occurred when navigation through the system. Additionally, it was also used to uncover trends in thoughts and opinions to be able to get a better insight into problems, if there were any.

During our research process, we had volunteers from Hillandale elementary school, from ages 7 to 10. With that being said this study included these components of research; study questions, propositions, units of analysis, logic linking data, and the criteria for interpreting to find the solution to the proposed task at hand being the usability test. The test was conducted at Durham public schools in a school classroom setting with two teachers to assist. While students worked on classwork each student had a 5 minute period to interact with the application and complete said tasks. Before completing the usability test each child was asked a set of five preliminary questions. The questions asked revolved around how the children interacted with educational material outside of the classroom and it asked about what types of materials were accessible to outside of school, the purpose of these questions was to receive insight on what activities and what items the children are accessible to at home. After the questions were asked

the child was prompted to complete a list of tasks within the 5 minute time frame. Within those

five minutes, the children were asked to complete a list of tasks while being allowed to freely

roam the application within that time. After the five minute periods were completed participants

were given a follow-up questionnaire that included five questions as well. These questions

discussed their overall thoughts about how they interacted with the application. It is important to

note that through this process the respondents received their questions verbally and their

responses were recorded by the usability test distributors. This was done to limit the amount of

confusion that could be caused by having children record their responses. By reading the

questionnaire out loud, the children were able to determine how to answer the questions. They

also had the option to ask for clarification if needed while being able to record their responses
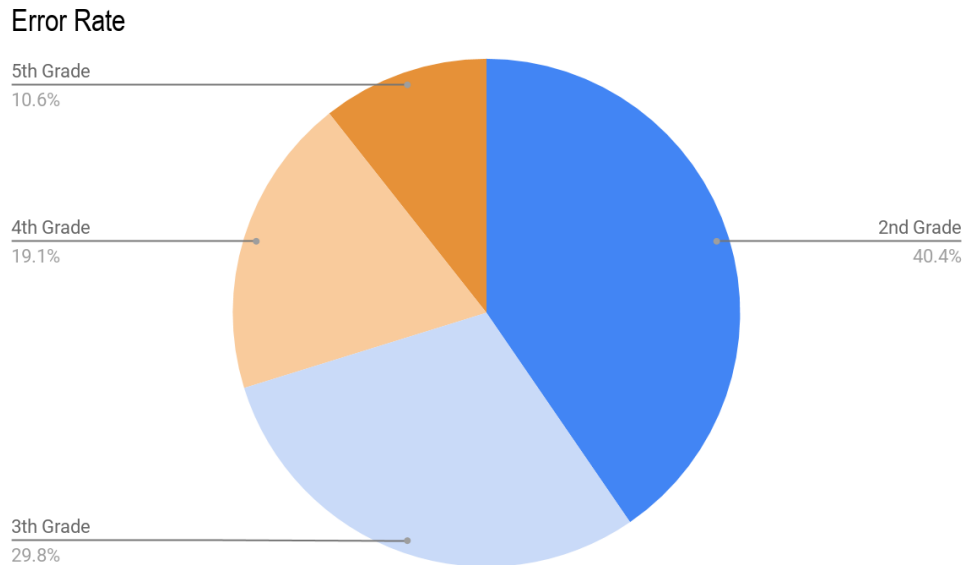
concisely.

Reflecting on the process of the method used there was room for improvement such as

timing. While we gave the respondents five minutes to complete all tasks, it would have been

beneficial to time each participant separately and monitored how long it took to complete each

task. Considering that the primary device of interest was the iPad we could have tested our

participants on an iPad device however, we decided to use mobile phones after receiving great

insight on how little iPads were used in the students' households in the questionnaire.

Results & Findings

The following data exemplifies the questions initiated by the proctor as well as the resulting

comments of the participants of the test.

The error rate was significant in that the students involved in the usability test

experienced multiple mistakes while completing various tasks in the application. The error rate

was found most problematic between the second and third-grade participants. This application was targeted towards children between kindergarten and fifth grade. The results from the testing suggest that younger users may have a harder time interpreting instructions and features within the application. (See chart below)

Error Rate

5th Grade
10.6%

4th Grade
19.1%

2nd Grade
40.4%

3th Grade
29.8%

The results primarily focused on qualitative data from children in grades second through fifth. Our findings centered on determining if the content and activities dispelled throughout the application were easy to understand by EduActiv8's primary users—children. Our results showed two primary areas of confusion amongst our participants. The primary area of confusion for all respondents was the trace portion of the application. The trace portion was a primary area of confusion because no instructions or illustrations were detailing what actions should be performed to complete the tracing task. Secondly, because the format of the activity is more of a cursive lesson as opposed to being gamified like the other two portions of the application. The fact that the tracing portion is so distinctively different from the rest of the application's activities creates a cognitive load due to the amount of thought it takes to complete the tracing

task. According to *Cognition & The Intrinsic User Experience*, "users rely on their own experience interacting with digital...products" and "users will make decisions they understand first, and will only stop to consider their decision if they don't understand what to do" (para. 25). Echoing standard conventions - layout, tasks, etc. - is the key to combating cognitive load issues. In EduActiv8's case, adding gamification to the tracing portion in addition to adding instructions should clear up any inherent confusion within this section.

The second area of confusion requires acknowledgment regarding the level portion of the application. Children experienced cognitive load issues due to confusion and choice because respondents were unsure of where to start when it came to choosing their academic level. They mainly choose a level based on a trial and error methodology. According to *Cognition & The Intrinsic User Experience*, "it's easier for a user to understand which option to select when he can see the alternatives" (para. 30). The easy fix for EduActiv8 to utilize when minimizing cognitive load issues is by displaying the specific attributes used to distinguish between the five levels. Essentially, adding more context such as listing a range of game levels and/or grade levels will add greater context for children to choose the level that is most appropriate for them.

Recommendations

Overall, EduActiv8 could make a great impression on its intended audience if it were to implement a few changes to its interface design. One specific change that could be made throughout the application is gamification. As stated by McGonigal (2011) games are unique in that they possess traits that make a captivating experience. She specifically states the essential components to making this happen are the inclusion of goals, feedback, rules, and voluntary participation (McGonigal, 2011). EduActiv8 already has traits of this in the application, but it

could be improved upon further. For instance, in the word matcher section, the application does not provide a substantial amount of feedback when individuals interact with it. Therefore, we propose that they incorporate more instances of feedback, especially feedback that can enable instant gratification. To do this, the developers could give sound indications to showcase when an answer is correct or wrong as well as having larger images, which will be discussed later in the text. As of now, the feedback showcased on EduActiv8 is lackluster; minuscule, and does not do much in terms of providing feedback for the audience.

As stated previously, the application proved to be challenging due to its lack of instructions. The application was difficult to traverse and engage with as there are no verbal or pictorial instructions on how to use the application's features. Therefore, we propose that instructions be included throughout the application either verbally or pictorially. If they are to be written verbally, it should not be verbose, but instead succinct so that it can be easily understood by its target audience. Adding instructions, illustrations, and/or an example problem is needed to add more context to the activities presented within the application. Negating to add instructional components leaves unnecessary room for cognitive load and barrier issues. These instances of instructions should be included as just-in-time features as well so that they will only be used to explain how to use the application when it is appropriate instead of all at once, which can be overwhelming. The just-in-time sequencing of tasks is important to incorporate throughout the application as the screen size is limited. Incorporating carousels and other swipe features will not only keep users engaged and accommodate slow lag times, but it will also limit confusion between the multitude on-screen tasks required of said user. Likewise, these instructions (and the overall design of the screens) should be echoed throughout the design to minimize cognitive load

and barrier issues. This will ensure that users know what to expect when interacting with the application.

These implementations would help greatly with another structural element the application lacks. EduActiv8 suffers from poor screen optimization as most of the screens involve an immense amount of white space that is not utilized effectively. To improve screen space, EduActiv8 can incorporate gestalt principles, specifically proximity and figure-ground relationships, to create a more cohesive design as displayed in *Fig. 2*. The previous design of the game displayed (word matcher) was difficult to engage with because all of the buttons were too close in proximity, small, and the lack of differentiation in colors added in the confusion, especially when it came to knowing if a question was answered correctly or not. With the new design, the improved proximity and size allows for users to easily differentiate between the pictures and words, and recognize when their responses are applied.

Lastly, it is suggested that a better navigation system be added to the application since there is only one back button, which makes navigating the application awkward and inconvenient. Incorporating breadcrumbs or a fixed navigation bar will minimize confusion and allow more flexibility for the users when navigating the EduActiv8 Application.
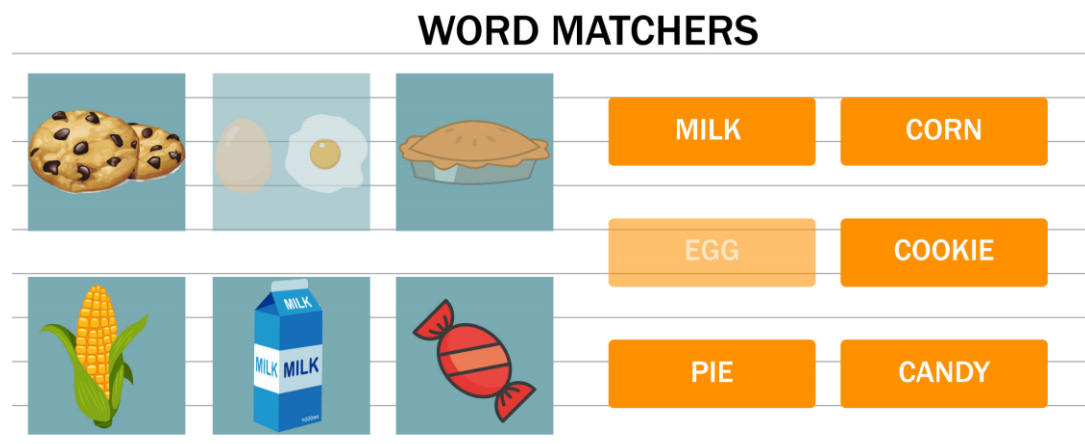
Figure 1

Figure 2

Figure 3

WORD MATCHERS

CORN

COOKIE

CANDY

GREAT JOB!

Appendices

Questions Before:

➢ What are your favorite things to read outside the classroom?
➢ Do you read for fun?
➢ What are your favorite ways to read?
➢ Is English your native language? If not, what is?
➢ When using your cell phone or tablet do you use a stylus pen?

Questions During/After:

➢ Did any of the directions or pictures confuse you? If the directions or pictures did confuse you, what do you think they mean?
➢ What was your process of moving through the app and why?
➢ What level did you choose? And why?
➢ How did you know what level to choose?
➢ Were there any problems you faced while exploring the app?
➢ Were you able to do any extra activities than the ones asked?

Participant	Questions Before	Questions During/After
Respondent #1 Age: 8 Grade: 3	● Read at home books "Frankenstein", Dogman, Comics ● Yes ● Yes English ● No, style pen	1. No 2. 1st game start from + go down 3. Didn't choose level + IDK didn't see it 4. Hardest thing job word watching 5. No "Hard words on matching"
Respondent #2 Age: 8 Grade: 3	● Book ● Yes ● Book ● English ● No	1. Confused on ABC thought it was a game 2. Discover letters first one 3. Did not pay attention to the level 4. No difficulties

		5. 2 games full + 3-word builders
Respondent #3 Age: 9 Grade: 4	● Books, graphic novels, highlights tablet ● Yes ● Yes ● No *Traced in every color*	1. Chose word matches most interesting 2/6 2. 1 too easy; 2 was about the same 3. No 4. Sort of boring

Respondent #4
 	
Age: 11
 	
Grade: 5
	● Home, bookshelf, newspaper comics (grandparents)
	● Yes
	● Book
	● English
	● Yes
		1. Never played it before
		2. Did not see a level
		3. Level 3, in the middle not too hard
		4. No
		   a. Word matcher? do you drag it? how do you do this? saw it turn blue
		   b. Interested in word matching
		
		"Its k-2, I wouldn't use it; too easy"

Respondent #5 Age: 10 Grade: 5	● Comic books, nonfiction ● Yes ● (refer to 1) ● Yes ● No	1. Trace didn't understand why letters (attempted to picture drag to words) 2. Better at spelling words 3. Didn't choose a level 4. N/A 5. No
Respondent #6	● None ● No	1. Don't like tracing on phone no instructions

Age: 11 Grade: 5	• Chapter book • Yes • No	2. Word matches b/c I wanted to 3. No 4. Level 4; kinda hard not hard as 5 5. Yes
Respondent #7 Age:11 Grade: 5	• Google • Yes • Books • Yes • No	1. No tracing was confusing though 2. I chose matching first because I like matching 3. Did not choose a level, didn't pay attention to it 4. Choosing color during trace 5. Yes
Respondent #8 Age: 7 Grade: 2	• Tablet, youtube • Yes, curious George • Books, subtitles • Yes • No	1. No 2. Went from top to bottom just because 3. Did not choose a level 4. I'm not good at cursive 5. No

Julien, J. (2012). Cognitive and the intrinsic user experience. *UX Magazine*, *799*.

McGonigal, J. (2011). Reality is broken: Why games make us better and how they can change the world. London: Jonathan Cape.