User Experience of Cognitive Digital Games Among Elderly People to Prevent Dementia

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Abstract. A few ponders have appeared that cognitive and physical work out can offer assistance diminish the hazard and indications of alzheimer's and dementia. The utilize cognitive technology can be an successful to anticipate or moderate the movement of alzheimer's and dementia. Creator past inquire about have created a crosswords memory diversion application with manufactured insights highlights as a refresher as one of the reviving media for cognitive treatment for the elderly . Research was conducted to test the user experience among users, namely the pre-elderly and elderly community. The research was conducted on 30 elderly people at the elderly posyandu. UX encompasses all user experiences and interactions with a product, service, or brand. It includes the user's feelings, emotions, and context when interacting. In this case, what is evaluated is the ease of navigation in playing games, whether this game is interesting and fun and whether there are less pleasant experiences. The result is for the convenience of navigation has a UX score of 68.42% out of a maximum of 100%, while the assessment for the fun experience of playing this game is 76.8%. The less pleasant experience is if there is a process of installing the game on a mobile device because it is quite troublesome so it needs a mentoring process. And the font size greatly affects the comfort of using the application, where the larger the font size, the better.

Keywords: Digital Games, Elderly People, User Experience, Cognitive Therapy

Alzheimer's infection and dementia are degenerative infections that influence the cognitive work within the elderly. These disarranges are undesirable since they diminish quality of life. Dementia or infirmity infection comprises of different sorts one of them and the foremost common is alzheimer's [1]. Until presently, no remedy has been found for the malady, but the dangers and side effects can be decreased with different treatments that can fortify the body's safe framework [2]. Keen diversions can be an successful instrument in helping cognitive and physical work out for the elderly. exercises that can optimize brain work can anticipate infirmity and dementia, such as perusing the sacred book, memorizing the Koran [3]. and playing brain mystery recreations. Diversions can invigorate the brain to anticipate or moderate down the movement of alzheimer's and moderate the movement of alzheimer's and dementia. In expansion, savvy diversions can too can give amusement and inspiration for more seasoned individuals to proceed working out and keep up their brain wellbeing.

Computer cognitive preparing programs are an viable and important way to move forward cognitive work in more seasoned grown-ups and may help in abating the weakening of cognitive work related with dementia [4] . The ponder included 4,885 individuals matured 50 a long time and over. The comes about appeared that playing keen diversions can offer assistance move forward cognitive capacities in older individuals within the long term. Recreations can moreover offer assistance make strides cognitive work and mental well-being in discouraged more seasoned individuals [5]. In expansion, smart games created particularly to assist cognitive training in more seasoned individuals can move forward cognitive capacities within the elderly and can offer assistance avoid or moderate the movement of alzheimer's or moderate the movement of alzheimer's and dementia [6]. A few diversions utilized to prepare cognitive work of individuals with alzheimer's and dementia incorporate crosswords [7][8], perplex diversions and memory recreations by coordinating cards [9]. However, these recreations are conventional recreations and not however in advanced shape. The interface of the application interface is shown in **FIGURE 1**.

(a) (b)

FIGURE 1. (a) memory game user interface page (b) loading page

Measuring ease of use and UX in cognitive mediation advances for more seasoned grown-ups with MCI or dementia gives an coordinates see that can contribute toward their legitimate advancement, since it isn't as it were critical to know in case the innovation is easy to utilize to realize the helpful objectives, but also whether the client sees it as charming. To require these estimations it is basic to include the target populace:
more seasoned individuals with cognitive disability, who can grant profitable input, in spite of their challenges. [10] The elderly individuals were more inquisitive about utilizing the application that contains as it were one button to see their readings, instead of exploring among distinctive menu choices. Considering this as the key point, the model was planned coming about in more noteworthy UX. The Glucosio application included help coordinating to certain functionalities as a short-cut choice. But most of the elderly did not even choose to utilize it. Most of the elderly were inquisitive about utilizing the portable applications as it were after they were helped by another individual on how to effectively utilize the application. [11]

This research aims to understand the preferences and needs of elderly users to make the gaming experience more enjoyable and inclusive. In addition, the research will evaluate how well the game can improve cognitive function and mental health, as well as the game's potential to improve social interaction among the elderly. As such, the results of the research are expected to provide guidance for the development of digital games that are more beneficial to the elderly population.

METHODS

This research method goes through several stages of research. The stages of the research methodare illustrated in Figure 2, with the following details:

1. Study of recent research
   Research activities begin with a study of the latest research aimed at collecting literature and the latest research on usability testing. to collect the latest literature and research on usability testing in game applications, especially in the context of puzzle games such as Memory Game Crosswords. Memory Game Crosswords. This study helped in understanding the best practices, methodologies, and tools used in usability testing.
2. Problem formulation
   Formulate a research question or problem that you want to answer through usability testing, namely :
   a. How to test the digital crosswords game prototype according to the ISO 9241-11 standard?
   b. How to make improvements to the prototype based on the test results so that it meets user expectations?
3. Determination of usability test method
   Choose a test method that suits the research needs, such as direct user testing, interviews, questionnaires, or a combination of several methods. In addition, determine the task scenarios to be tested and the success measurement criteria.

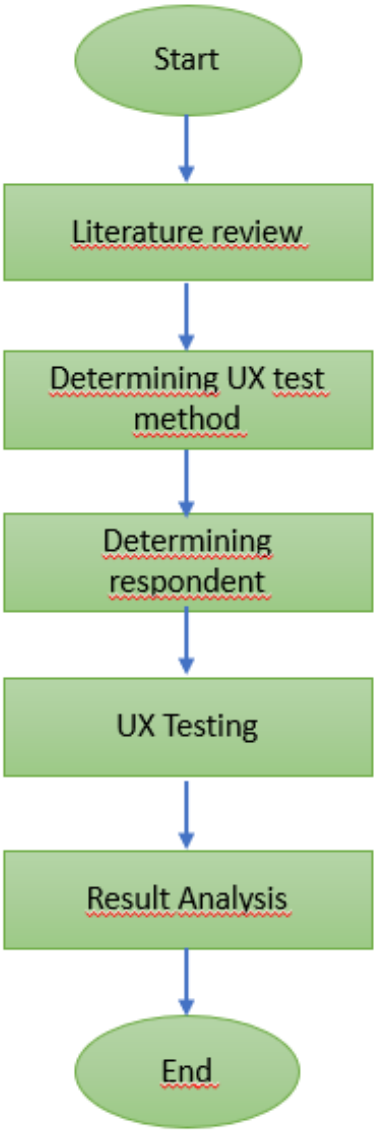

FIGURE 2. research method

1. Determine the profile of respondents who represent the target users of the application namely respondents over 50 years old. Respondents have the skills using a smartphone or tablet device. The number of respondents targeted is at least 30 people.
2. Implementation of usability test
   The implementation of the usability test is carried out by inviting respondents who have been determined to participate in usability testing. The procedure procedure is to provide instructions to respondents and facilitate during the sessions, recording user interactions, and observing user reactions and behaviors during testing. behavior during testing. measurement instrument using ISO 924-11 from the user experience aspect, namely ease of use and user satisfaction.[12].
3. Analyze the results by considering the scores from the UX. This may require further interviews or surveys to understand the causes of the problems and user needs. The level of Effectiveness and efficiency is measured using user's success rate. effectiveness and efficiency are calculated by the following [13], [14].

$$Effectiveness, Efficiency\ (\%) = \frac{(\sum_{i=1}^{n} x_i\ )}{n}\ x\ 100\% \quad (1)$$

Where x_i is user's success rate, Xi = {0,1}.

$$Usability\ (\%) = \frac{(\text{Effectivenes+ Efficiency+ Satisfaction})}{3}\ x\ 100\% \quad (3)$$

$$Satisfaction\ (\%) = \frac{(\sum_{i=1}^{n} x_i\ )}{5\ x\ n}\ x\ 100\% \quad (2)$$

Where x_i is user's success rate, Xi = {0,1,2,3,4,5}.

Usability of applications is the mean of Effectiveness, Efficiency and Satisfaction by the following equations :

After the user completes all existing tasks, the next step is to distribute questionnaires to 38 respondents. The questionnaire is design using language that is easily understood by the respondents.and adopted from [15]. After conducting a trial based on the assignment that has been given, the result of the calculation of the usability value in detail can be seen in Table 2 and Table 3.

Table 1. UX Instrument

Criteria	Question
Ease of Use	It is easy to use
	It is simple to use
	It is user friendly.
	It requires the fewest steps possible to accomplish what I want to do with it.
	It is flexible
	Using it is effortless
	I can use it without written instructions
	I don't notice any inconsistencies as I use it.
	Both occasional and regular users would like it
	I can recover from mistakes quickly and easily.
	I can use it successfully every time
User Satisfaction	I am satisfied with it.
	I would recommend it to a friend.
	It is fun to use.
	It works the way I want it to work
	It is wonderful
	I feel I need to have it.
	It is pleasant to use.

RESULTS AND DISCUSSION

After conducting a trial based on the assignment that has been given to test the gameplay as displayed on Figure 2, the result of the calculation of the usability value in detail can be seen in Table 2, Table 3 and Table 4.

Table 2. Result of Satisfaction

No	Question	Satisfaction (%)
Ease Of Learning		
1	I learned to use it quickly.	78
2	I easily remember how to use it	82
3	It is easy to learn to use it	81
4	I quickly became skillful with it	80
	Average	80,4

Table 3. Result of Efficiency.

No	Question	Efficiency (%)
Ease Of Use		
1	I am satisfied with it.	76
2	I would recommend it to a friend.	80
3	It is fun to use.	77
4	It works the way I want it to work	81
5	It is wonderful	77
6	I feel I need to have it.	70
7	It is pleasant to use.	76
	Average	76,8

Interpretation of UX score described as follows :

Table 4. Interpretation of Usability Score.

No	Percentage	Interpretation
1	0% - 20%	Very Bad
2	21% – 40%	Bad
3	41% – 60%	Pretty good
4	61% – 80%	Good
5	81% – 100%	Very Good

It can be seen from the usability score results obtained, all items exceed the score limit value, which means there are no features that must be overhauled. However, respondents were asked about things that need to be improved, including font size and gadget screen responsiveness. So that the font size will be fixed with a larger size. the usability assessment reveals that the product scores well in both satisfaction (80.4%) and efficiency (76.8%), categorizing it as "Good" in both areas. Users find it easy to learn and remember, indicating a positive learning experience, while also

expressing satisfaction and a willingness to recommend it to others. However, the slightly lower score regarding its perceived necessity suggests potential areas for improvement to enhance its value to users. Overall, the feedback highlights a favorable reception, with room for further enhancements to increase its essentiality.

CONCLUSIONS

The usability assessment indicates a strong overall performance of the product, with an average satisfaction score of 80.4%, placing it firmly in the "Good" category. Respondents reported a high level of ease in learning to use the product, as evidenced by scores ranging from 78% to 82% on various related questions. This suggests that users not only grasp the functionality quickly but also retain that knowledge effectively, leading to a skillful use of the product. Such positive feedback highlights the product's design and instructional elements, which contribute to a seamless learning experience, making it accessible for a wide range of users.

On the efficiency front, the average score of 76.8% also falls within the "Good" category, indicating that users are generally satisfied with their experience. Most respondents expressed a willingness to recommend the product to others and found it enjoyable to use. However, the score of 70% for the necessity of the product suggests that some users may not see it as essential in their daily lives, pointing to an opportunity for improvement. By addressing this perception and enhancing the product's value proposition, the developers could further solidify user engagement and satisfaction, ultimately leading to a stronger market presence.

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