

DysPReX: A Game-based Reading Tool for Children with Dyslexia

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Abstract : Teaching the students with Dyslexia is very challenging as they naturally have difficulties in phonetic decoding. Past studies revealed that in the phonic-based intervention methods, students only made slow reading progress or no progress at all. A game called DysPReX was developed as an alternative intervention tool with little emphasis on phonics. The aim is to help the dyslexics to learn spelling and reading in a more fun and exciting way at their own pace. DysPReX was developed using Unity and runs on mobile devices and tablets which gives flexibility to the dyslexics to play it anywhere and anytime. The development took 4 months to complete and followed the standard development methodology which include planning, requirement gathering, design, prototyping and evaluation phases. DysPReX has several advantages over the existing dyslexic games: (1) it uses Bahasa Melayu as medium while majority of the existing off-the-shelf dyslexic games use English. To date, the number of dyslexic games in Bahasa Melayu is very limited; (2) it was developed according to the guideline for the dyslexic games, thus it incorporates the specific learning needs of the dyslexics. This includes what font type and size to use, the colors and the focus on the often-mixed-up letters such as b/d, u/n, m/w, g/q, p/q and b/p. DysPReX has been evaluated by 30 respondents and the results show positive feedback from the majority on the user interface, functionality, learnability, and satisfaction aspect with the score above 4.0. Therefore, the game fulfilled the respondents' needs. DysPReX could contribute to the achievement of the United Nations sustainable development goals for quality education, reducing inequalities and sustainable communities. Quality education for the dyslexics can be achieved if they can overcome the hurdles in reading, which will allow the other goals to be achieved.

Keywords: DysPReX, Dyslexic Games, Dyslexia Intervention

1. Introduction

Dyslexia is a neurological condition that affects people's ability to read, write, and speak [1]. It is a particular problem with reading and spelling that is somehow unexpected and therefore requires a

diagnosis and an explanation, as well as specialist intervention [2]. Traditional intervention methods for the dyslexics place strong emphasis on phonics as this is the area the dyslexics struggle the most. Unfortunately, the strategy does not work well with the dyslexics as they are unable to categorize the sounds of language or make connections between sound and meaning in the same way as other students. Recently, games are also utilized as alternative to traditional intervention methods of teaching the dyslexics [1]. Games can offer many activities to test a child's talents in numerous reading and writing skills, as well as their matching abilities in visual and auditory perception [3]. In light of this, a game called DysPREX was developed to help the dyslexics to learn spelling and reading in a more fun and exciting way at their own pace. **Figure 1** shows the interfaces of DysPREX and game modes it consists of.



Figure 1: DysPREX Interface

2. Materials and Methods

DysPREX was developed according to the four main phases as shown in **Figure 2**.



Figure 2: The Methodology

The design of DysPreX followed the criteria listed in the guideline [4]. Criteria that meet the dyslexics' specific learning needs (for example, the type and size of font that help them to learn better) were gathered and analyzed from past studies and used to develop the guideline. Unity 3D is used to develop the prototype of the game which took four months to complete. DysPREX has been evaluated by 30 respondents and the results are discussed in the following section.

3. Results and Discussion

Figures below show the results from usability evaluation. As shown in **Figure 3**, the overall results are above the average (2.50). Users agreed that the user interface of DysPreX is neat, creative and looks comfortable, the font is easy to read, and the images are easy to understand. Respondents indicated that they feel comfortable with the color elements used in DysPreX.

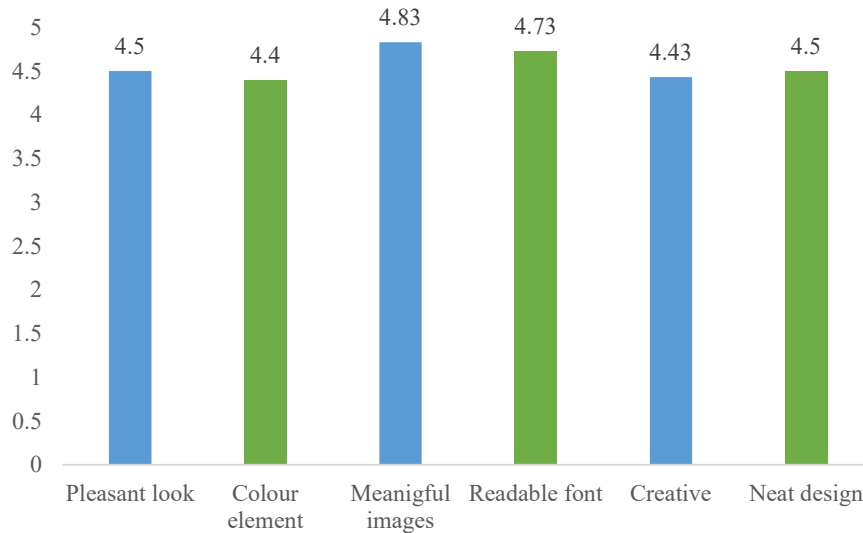


Figure 3: Average Score for Interface Construct

The highest score is 4.83 for “images easy to understand” indicates that the images in the game are straightforward for the respondents so that they can understand easily.

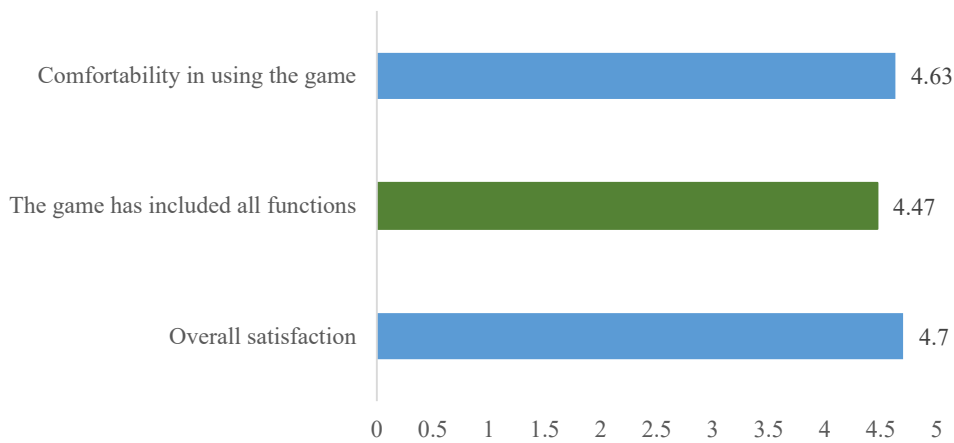


Figure 4: Average Score for Learnability Construct

Figure 4 also shows the results above the average of 2.5 and most respondents totally agreed with the aspect “I feel confident to use this game” with the average of 4.67. The results of other aspects in this section are the same which is 4.47.

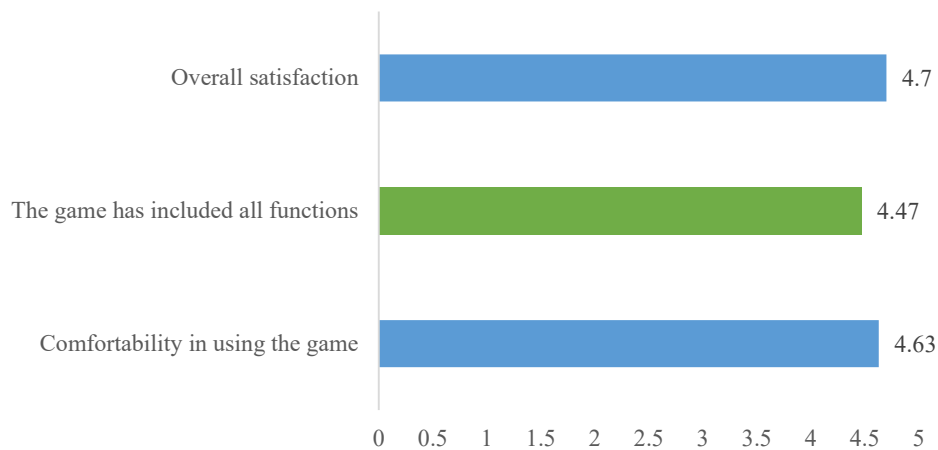


Figure 5: Average Score for Functionality Construct

The functionality test also revealed the results are above average (**Figure 5**). The highest score is 4.8 for “all buttons are functioning well” indicates that the respondents can utilize all the buttons to play the game.

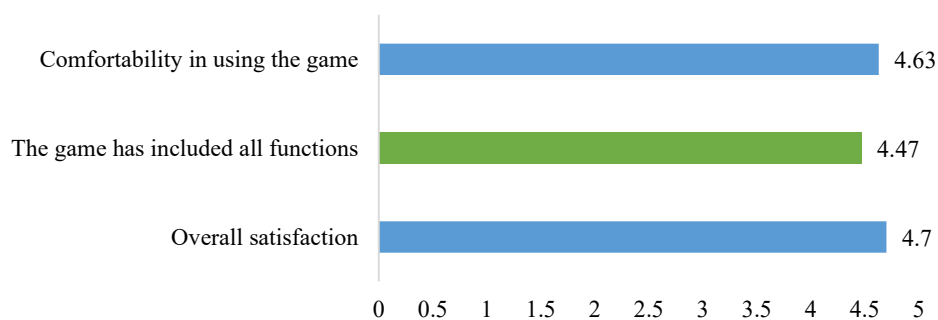


Figure 6: Average Score for Satisfaction Construct

In terms of satisfaction, respondents agreed that they are satisfied and felt comfortable to use this game. DysPreX has included all functions they expect to have. Most respondents totally agreed with the aspect “I satisfied with the game” with an average of 4.7 (**Figure 6**).

One respondent commented on the dragging picture game which is somewhat confusing. Another respondent suggested that the design can be improved, and the game can be made simpler. The current version of DysPreX has been modified according to these comment and suggestions. Due to the time constraint, the other suggestions such as “more stages can be added for each gameplay mode”, “buttons can have more sound effects”, “the buttons can be more attractive” and “incorporate more criteria from the guideline” will be implemented in future work.

4. Conclusion

In conclusion, DysPreX has been developed as an alternative solution to the problem faced by the dyslexics in spelling and reading. Little emphasis is given on phonics despite knowing that it is the area in which the dyslexics struggle the most. Instead, DysPreX focus on creating a fun environment for them to learn while playing. DysPreX incorporates the criteria which have been agreed as appropriate for the dyslexics. We have met the first objective to incorporate some of the criteria from the guideline into DysPreX. The next objective is to study the impact of DysPreX on the dyslexics’ spelling and

reading skill; this requires the dyslexics to use the game for a certain period of time. The impact will be measured afterwards, and modifications (if any) will be made accordingly. Future work will then focus on incorporating more criteria from the guideline into the new version of DysPreX.

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