DEVELOPMENT OF A GAMIFICATION-BASED READING LEARNING PROGRAM FOR CHILDREN WITH DYSLEXIA

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Abstract

This study aims to develop a gamification-based reading learning program as a form of innovation in supporting the literacy skills of children with dyslexia. The background of this study is the limited adaptive and enjoyable learning media for children with specific barriers in reading, as well as the need for interventions that can facilitate phonological awareness and word recognition effectively. This study uses a descriptive approach with a simplified research and development (R&D) method in three stages, namely Needs Analysis, program Development, and validation by experts. Data were obtained through initial assessment, interviews with teachers and parents, and validation through focus group discussions. The results showed that programs designed according to the characteristics of children with dyslexia, utilize gamification elements such as points, levels, visual feedback, and interactive narratives. Expert validation shows that the program is feasible to use and can be an attractive and responsive alternative learning medium. Although this study does not yet include direct implementation trials, the development results make an initial contribution in designing a more personalized and enjoyable learning approach for children with special needs in reading. From the above research, it can be concluded that based on the results of validation by media experts, material experts, and input from accompanying teachers, the developed program is declared feasible and in accordance with the characteristics and needs of children with reading barriers. The program has shown potential in presenting phonological material in a more interactive and fun way through gamification of elements such as points, levels, and visual narratives.

Keywords: dyslexia, gamification, learning to read, children with special needs

1. INTRODUCTION

Dyslexia is indicated by primary learning difficulties related to problems with language and writing, such as reading, writing, spelling, and also related to numbers such as counting and mathematics. This difficulty is due to the existence of complex neurological disorders and minimal brain dysfunction problems that make it difficult for individuals to process information efficiently such as difficulty processing phonological, disruption of working memory function, and obstacles performing various basic skills (Primasari, I. F. N. D., & Supena, A. 2021). .Children who experience reading barriers generally have low awareness of the structure of sounds in spoken or oral language, it is called phonological awareness (Nurhaq, H. M., Mulyati, Y., & Rahma, R. 2020) which led to the challenge of accurate and fluent reading. According To Carroll, J. M., et .al, phonological awareness

is defined as a sensitivity to analyze, store, and manipulate sounds in a language into the smallest parts and mapped into writing. Kilpatrick (in Nurhaq, H. M. 2019).

In the past decade, education for children with special needs, including children with dyslexia, has undergone a significant transformation as learning technologies have developed. One approach that is growing rapidly is gamification, gamification is a strategy and also a learning method that involves various elements in the game(game), with the aim of creating a new learning atmosphere, more interesting, and easy to enjoy for learners so as to increase the interest and participation of learners in learning activities (Ariani, D. 2020; Febriansah, A. T., Syaifuddin, A., & Soepriyanto, Y. 2024). In the context of dyslexic children, who are often demotivated to learn due to repeated academic failures, gamification has great potential to be a fun and therapeutic innovative solution.

Several studies have shown that phonics-based educational games can improve basic reading skills, especially when combined with multisensory approaches that fit the neurological profile of dyslexic children. Research conducted by Sultan, M. A., Zainal, Z., & Momang, A. A. (2024) showed that gamification methods have a significant effect on students ' reading comprehension skills. Research conducted by Albarqi, R. A., & Ainin, I. K. (2019) which shows that it can be concluded that gamification is successful and shows an increase in the results of the writing ability of early dyslexic children. Similarly, Ren, X., Wu, Q., Cui, N., Zhao, J., & Bi, H. Y. (2023) found from the results of his research found that digital game-based training exerts a significant influence on improving basic cognitive and literacy skills in children with neurodevelopmental disorders, including dyslexia.

However, in Indonesia, there are still minimal efforts to develop gamification-based reading learning programs designed specifically for children with dyslexia. Many outstanding literacy applications emphasize only mechanical repetition without considering the typical needs of dyslexic children such as explicit phonological structures, visual-auditory reinforcement, and a flexible individual approach. Therefore, innovations are needed that are not only visually interesting and interactive, but also built on deep pedagogical and psychological principles.

This study aims to develop a gamification-based reading learning program as a form of innovation in supporting the literacy skills of children with dyslexia. The Program is expected to improve children's engagement, motivation, and reading skills through a fun, adaptive, and easy-to-use design. The study also evaluated the feasibility and effectiveness of such programs in improving phonological skills and motivation to learn to read children. The results of this study are expected to make a real contribution to the development of inclusive and Evidence-Based Learning media for Indonesian education.

2. METHOD

This study uses research and development methods with a descriptive approach. According to Borg and Gall, research and development is a research method used to develop or validate products used in educational and learning activities on an iterative basis, such as field trials and revisions, to produce products that meet established objectives (Rabiah, S., 2018). The focus of this study is to develop a reading learning program for children with learning difficulties (dyslexia) based on the results of assessment, identification and revision of experts. In this study, researchers simplify the R&D model into 3 steps that are tailored to the research objectives to be achieved. These stages are the needs analysis stage, the program development stage, and the validation and revision stage.

This research was conducted from October 2024 to December 2024 at the special education intervention Laboratory, Universitas Pendidikan Indonesia. The target of this study was to design a reading learning program using gamification method for children who have difficulty learning to read (dyslexia), especially in the ability of phonological awareness and the ability to read words.

The study subjects were 10-year-old girls who had specific learning barriers on reading aspects based on the results of previous assessments. Subject selection is based on suitability with the research to be conducted and through consultation with teachers and lecturers.

The procedure in this study consists of three stages, namely: needs analysis stage, program development stage, and validation and revision stage. The research process begins with the first stage, namely the needs analysis based on the results of previous assessments to determine the ability, barriers, and needs of the subject in various aspects, especially in the aspect of reading. Additional Data can be obtained through interviews with accompanying teachers and parents to obtain additional information regarding the condition of the subject. After obtaining data on the condition of the subject, the next step is the program development stage, at this stage a program is designed that is adapted to the results obtained in the first stage regarding the condition of the subject. The third stage, validation and revision, at this stage validation is carried out by teachers through focus group discussions or lecture progress reports and revisions are made based on validation and conditions in the field.

The data obtained were analyzed descriptively qualitative. The results of the assessment were analyzed to determine the specific learning needs of the subjects, while validation and revision were analyzed to evaluate the changes made. The final Program is described in a narrative manner as the result of development that has been adjusted with expert input.

3. RESULT AND DISCUSSION
Needs analysis stage

At this stage, the researcher conducts identification and assessment of the subject in order to determine the condition of the subject including the subject's abilities, obstacles and needs. Identification is carried out in 3 aspects, namely reading, writing and arithmetic. The assessment is carried out on the aspects of reading and visual perception. After the assessment is carried out, the subject profile is obtained as in the table below.

Table 1. Subjek Profile

Potential	Obstacle	Learning Needs
The subject is able to show and mention vowels and consonants one by one	Sometimes the subject is still wrong in showing and mentioning letters when spelling words such as b becomes d, j becomes g, and k becomes t	Repeated learning on words that have the letters b, d, j, g, k, and t.
The subject is able to read words with CV patterns fluently	In more complex syllable patterns such as VV, VK, CVK, KKV, VKK, KKVK, CVKK, KKKV, KKKVK, KKVKK, the subject is still confused in reading them	Providing intensive practice in reading syllables with complex patterns, starting from the easiest pattern
The subject is able to read words often encountered every day easily	The subject is not yet able to read words that are rarely heard and used in everyday life	Introducing and providing understanding of rarely used words
Subjects have good visual memory skills	Subjects are less careful in grouping objects in images	Providing training to improve focus
Subjects are able to find differences and similarities between objects in images.		
Subjects are able to copy sentences in the text provided	The subject's writing seems quite tight between each word and still doesn't use punctuation correctly.	Providing writing exercises to increase awareness of word spacing
The subject can repeat 3 words mentioned by the assessor correctly	When given 4 and 5 words, the subject was only able to repeat 3 words correctly.	Providing training to improve abilities through auditory
Subjects recognize differences in punctuation marks	Subjects still do not know and understand the use of punctuation marks	Introduction to punctuation through simple texts that are easy to understand and related to everyday life.
Subjects can analyze the initial, middle and final sounds of a word	The subject is not yet able to analyze the sound in a word if one of the letters is changed.	Increasing phonological awareness
The subject can describe an object	The subject is not yet able to describe the image comprehensively using many types of words such as conjunctions and adjectives.	Introduction of new words for the subject and oral expression training

Based on the data from the subject profile, it can be seen that the subject has shown basic reading skills. One of them is that the subject has good visual perception, the subject is able to

distinguish objects, find similarities and differences in objects, has good visual memory, the subject is able to mention and show letters of the alphabet, the subject is also able to distinguish consonants and vowels. However, the subject still experiences obstacles such as errors in distinguishing sounds and shapes of several letters of the alphabet, has not been able to read complex syllable patterns, has difficulty reading new words that have never been seen or heard, and has difficulty in determining the sound of words when the letters are changed, for example the letter a in the word "baju" is changed to the letter e to become "beju". Based on the assessment results, it was also found that the subject has quite good auditory memory skills, but still needs training to improve it because the subject often has difficulty remembering the order of words mentioned by the assessor. In addition, the subject has not been able to describe events in the picture into a story. The subject tends to mention objects separately without using conjunctions or descriptions, such as "ball, two" when given a picture of two balls. Based on the abilities and obstacles experienced by the subject, the subject needs help to improve his reading skills. Learning needs such as intensive and repeated learning to be able to distinguish the shape and sound of the letters b, d, j, g, k, and t in the words read, and to help subjects get used to reading words with more complex patterns such as VV, VC, and CCV. Subjects need to get used to reading books so that their vocabulary increases and is able to help subjects understand the meaning of new vocabulary. In the auditory aspect, subjects need to receive training to improve their ability to discriminate, compare, and classify syllable sounds in words. Furthermore, subjects also need to be given learning content in stages, from the easiest to the most difficult, the aim is to help subjects think systematically and structured.

Program development stage

Based on the results obtained in the first stage, namely Needs Analysis. The researcher designed an Individual Education Program (IEP) which aims to improve the reading ability, auditory memory, and oral expression of the subjects. The researcher identified that the subjects' difficulties in reading were caused by suboptimal auditory memory and oral expression abilities, as well as the limited number of vocabulary mastered.

Table 2. Learning Program

Learning objectives		Learning Activities	Media	Execution time	Executor	Evaluation
Long Term Goals	Short Term Goals					

Students can read SPOK pattern sentences correctly	• Students are able to name the letters of the alphabet correctly • Students are able to read patterned words/syllables	1. Getting to know how to read patterned syllables from teachers with the help of letter blocks and worksheets 2. Pronouncing the syllable pattern VV while holding the letter block 3. Reading patterned words/syllables contained in NOUN cards and verb cards	Worksheets, letter blocks, noun cards, verb cards	6 Months	Teacher	Observation
	• Student are able to re-mention the 3 words mentioned by the assessor	1. Listening and listening to 3 words given by the teacher 2. Re-mention the 3 words already mentioned oelh teacher	-			
	• Students are able to make patterned sentences SPOK based on images	1. Creating sentences based on pictures on picture cards with teacher guidance	Picture Card			
	• Students are able to to read sentences composed of 3 word.	1. Read the sentences given by the teacher	Sentence cards			

Validation and revision stage.

After implementing the individual learning program three times, the author found that the learning that was implemented was ineffective. There were too many learning objectives so that it indirectly forced students to understand the learning quickly which was not in accordance with the speed of the students. Students tended to be unenthusiastic and looked uncomfortable when learning took place. The author tried to take a more fun and challenging approach, namely with a treasure hunt game, where students had to find paper containing words through instructions (3 words) given by the teacher. On the paper, there are words that students must then read and arrange into one complete sentence. The choice of the treasure hunt method also takes into account students who like to be given challenges gradually.

Treasure hunt is one of the methods used because through this model teachers can collaborate games with learning so as to make learning more fun and encourage students to be active in learning (Asmita, 2024). Learning through the treasure hunt method can stimulate the mind, challenge, foster active learning, increase the success of activities and learning outcomes of students so that the learning process can be achieved optimally (Sudarto et al., 2023; Suryanti et al., 2022).

In addition, the addition of learning objectives to increase phonological awareness is also given. The author assesses that one of the reasons why students still have not read and is very crucial is the lack of phonological awareness. This learning design is based on William L. Heward's book (2009) entitled Exceptional Children An Introduction to Special Education which states that the most important aspect of phonological awareness for learning to read is phonemic awareness, namely the knowledge that words consist of separate sounds, or phonemes, and the ability to manipulate these sound units. One of the initial stages in teaching phoneme awareness is phoneme deletion, so the author decided to provide learning in the form of removing one of the syllables in the word, such as "What if the sound 'da' in the word 'bicycle' is removed?".

Tabel 3. Revision Learning Program

Purpose		Learning Activities	Media	Learning strategies & approaches	Execution Time	Execution	Evaluation
Long-term goals	Short-term goals						
Student are are able to read sentences correctly	Students are able are able to read words patterned VV, VK, KVK, and KKV (ny, ng)	1. Treasure hunt game 2. Reading words on paper 3. Deciphering words in paper 4. Reading books	Paper, surrounding objects, books, word cards, whiteboards, markers	Approach: Constructivism Strategy: game based learning Method: Game Technique: Material: patterns of syllables, words and sentences.	80 Minutes	Assessor	Test, observation, performance

4. CONCLUSION AND RECOMMENDATION

From the above research, it can be concluded that based on the results of validation by media experts, material experts, and input from accompanying teachers, the developed program is declared feasible and in accordance with the characteristics and needs of children with reading barriers. The program has shown potential in presenting phonological material in a more interactive and fun way through gamification of elements such as points, levels, and visual narratives.

The limitation of this study is that there has not been a direct implementation test to the subjects in the long term, so that the effectiveness of the program to improve children's reading skills

can not be measured thoroughly. In addition, a study subject limited to a single girl also limits the generalization of the results to a wider population.

The implications of this study suggest that gamification-based approaches can be an innovative alternative in learning to read for children with dyslexia, especially in inclusive education environments. This Program can be the basis for the development of a broader and Adaptive Learning media.

Recommendations are addressed to special education teachers, curriculum developers, and researchers in the field of inclusive education to integrate gamification approaches in early literacy learning. In addition, it is recommended that further research be conducted to test the implementation of the program on a broader scale, both in terms of the number of learners and the duration of use, in order to measure the long-term impact on reading ability and learning motivation of children with dyslexia.

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