

Lexia in Wonderland: Korean Education Service for Children with Dyslexia

Daye Kang*, Hye-Min Choi*, Ka-Hyun Kim**, and Younjoon Lee*

* Visual Communication Design, Hongik University,

**Communication Design, College of Design & art, Hongik University

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1. Introduction

Children with dyslexia can experience significant improvement in symptoms if treatment is provided between the ages of 5 and 8, which can greatly reduce the difficulties caused by dyslexia in adulthood. However, due to a lack of specialized dyslexia institutions in the country, high treatment costs, and a general lack of public understanding about dyslexia, many children miss the optimal treatment window. This study proposes a service that allows children with dyslexia to consistently learn the Korean alphabet (Hangul) at home in a fun and systematic way without the burden of excessive educational costs.

2. Characteristics and Limitations of Dyslexia Treatment

Among the educational methods currently used in South Korea, phonological instruction for the Korean alphabet (Hangul) has proven to be the most effective (Choi Hoon-il & Jang Young-geon, 2008). When treated at specialized institutions, experts provide immediate pronunciation corrections tailored to the child's condition and ensure repeated practice until mastery. They also utilize various visual and auditory materials.

However, at home, due to the lack of expertise among parents, it is difficult to conduct such education, and there are no available guides to follow. To investigate this issue more deeply, interviews were conducted with two dyslexia therapists, one university student with dyslexia, and a parent of a child with dyslexia. The following common opinions were identified:

1) The Importance of Timing in Dyslexia

Treatment: Dyslexia is a language-related condition, so early treatment yields the best results. However, many children in South Korea miss the optimal treatment window due to a lack of specialized institutions, high treatment costs, and other reasons. As a result, they often struggle with dyslexia for extended periods.

2) Psychological Issues Caused by Dyslexia:

Reading is a significant part of the South Korean education system. Children who fail to overcome dyslexia at an early age often face bullying from peers or experience low self-esteem due to poor academic performance. Trauma formed during childhood can persist into adulthood (Han Yoon-ok et al., 2015).

3) The Need for Engaging Dyslexia Educational

Content: The educational materials currently used in treatment centers and homes are often rigid and contain content that even adults find difficult to understand. These materials generally require constant guidance from experts, and it is common for children to lose interest in learning the Korean alphabet (Hangul) and refuse to participate in lessons. Therefore, there is a need for easy and enjoyable content that children can engage with consistently and independently.



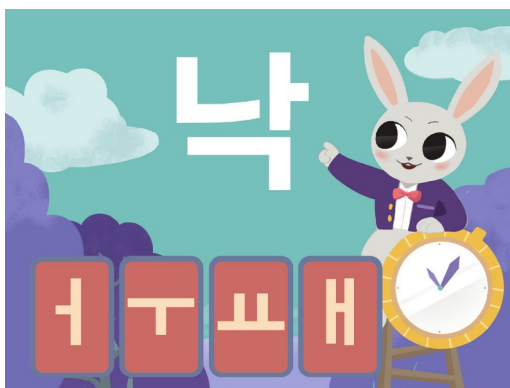
[Figure 1] Lexia in Wonderland Start Screen

3. Design suggestions

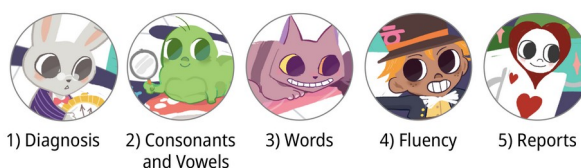
Based on the interview findings, this study proposes a Hangul educational game for dyslexic children titled "Lexia in Wonderland" (Figure 1). The game is structured into categories such as dyslexia diagnosis, treatment, progress improvement, and community. The following limitations are addressed:

1) Simple Dyslexia Diagnosis Test

Early treatment is critical for dyslexia, but many children miss the opportunity for treatment because they are not tested for dyslexia. To prevent this, children suspected of having dyslexia can take a simple dyslexia test through the game (Figure 2). The game primarily assesses whether the child can freely combine the sound values of vowels and consonants. Based on the results, it can be connected to specialized institutions for early detection. The game also adapts to the child's level and provides tailored games accordingly.



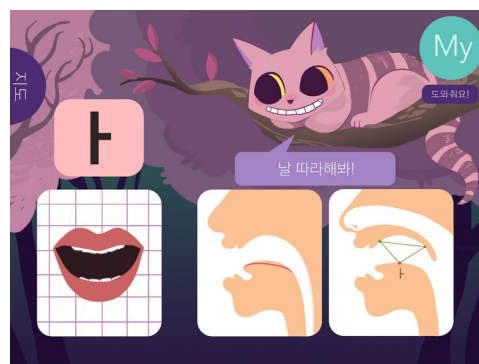
[Figure 2] Dyslexia Diagnosis Test Screen



[Figure 3] Characters for Each Stage of Dyslexia

2) Step-by-Step Storytelling Game Content

Children with dyslexia often possess rich imaginations and artistic talents. Therefore, it is crucial to engage them through storytelling that stimulates their imagination and adds an element of fun, rather than relying on rigid content. Drawing inspiration from Alice in Wonderland, the game is designed to let children embark on an adventure through the whimsical world of Hangul. This approach makes learning Hangul enjoyable and interactive. Each stage features main characters who guide and lead the child through their respective chapters (Figure 3).



[Figure 4] Pronunciation Learning Using Audio and Video

3) Enhancing Multisensory Understanding with Interactive Content

Traditional learning materials rely solely on visual resources, lacking audio and video content, which makes it difficult for children to grasp concepts effectively. To address this, the proposed game incorporates interactive video and audio elements, enabling children to learn more easily and enjoyably. Characters in each chapter provide guidance and encouragement, leading children step by step through the learning process in a natural and engaging way (Figure 4).



[Figure 5] Combining Hangul Blocks

4) Phonological Training Through Nonword Block Games

In addition to screen-based learning, a block game for practicing nonword combinations has been added with input from dyslexia experts. Nonwords are random sequences of letters with no meaning. This game addresses the tendency of children with dyslexia to memorize words as whole units without understanding their structure. By practicing nonword combinations using blocks, children can improve their understanding of phonological principles (Figure 5).

The blocks are integrated with the "Lexia in Wonderland" game, providing feedback and tracking practice results. This hands-on activity helps increase focus by engaging the child's tactile senses and complements screen-based repetition learning, delivering diverse stimuli that enhance the overall learning effectiveness.



[Figure 6] Data Analysis Screen

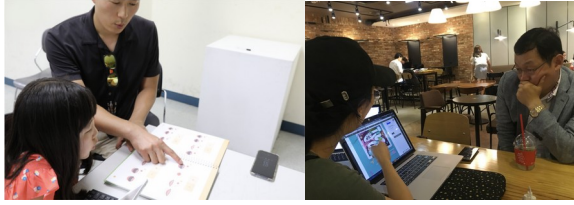
5) Providing Educational Guides Through Data Analysis

The service does not stop at training but also analyzes usage data to provide valuable insights for parents. Metrics such as error rates by vowel and consonant, combination accuracy, and achievement levels are analyzed to help parents understand and guide their child's learning process (Figure 6). This allows for precise identification of strengths and areas requiring improvement, thereby enhancing the effectiveness of education and training.

4. Design Evaluation

To validate the design, a dyslexic child and their father were observed using a traditional dyslexia textbook followed by the same content delivered via the app (Figure 7, left). The results showed that while the parent initially found it challenging to guide learning using the book, the structured guide provided by the app made the process much easier. Additionally, the child found the app more engaging and followed along with interest.

Based on feedback that children would enjoy playing the game with peers, a multiplayer design feature was added. Further validation of the nonword combination game was conducted with experts, followed by iterative improvements (Figure 7, right).



[Figure 7] Comparing Book and App Usage (Left) and App Validation by Dyslexia Experts (Right)

6. Conclusion

Through multiple interviews conducted during the research phase, it became clear that many parents of children with dyslexia desire a letter-based game tailored to their needs. This service is expected to help children avoid missing critical treatment opportunities and achieve improvements in their reading abilities.

By adopting proper treatment methods from an early age, the service aims to prevent psychological trauma, helping children regain self-esteem and confidence. By delivering therapy tools in the form of play, children are encouraged to develop an interest in learning Hangul and enjoy the treatment process independently.

With further validation and enhancements, this service is anticipated to provide a better educational experience for many dyslexic children, parents, and teachers.

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