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DIGITAL INTERACTIVE STORYTELLING TO PROMOTE THAI LANGUAGE VOCABULARY LEARNING FOR CHILDREN WITH DYSLEXIA

Kanvipa Hongngam[1], Jira Jitsupa[1], Venus Skunhom[1], Chirapong Yanuchit[2], and Natchaphak Meeusah[2]*

[1] Faculty of Education, Suan Dusit University, Thailand
[2] Faculty of Mass Communication Technology, Rajamangala University of Technology Thanyaburi, Thailand

[*] ***Corresponding author:***
Venus Skunhom
venus_sku@dusit.ac.th

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ABSTRACT

The ease of access and use, along with the other benefits of digital technology, have greatly changed the styles of teaching and learning. Digital technology plays a role in meeting the needs of learners at all levels. In particular, learners who are able-bodied can apply digital technology for learning, as well as in their daily lives. However, people with disabilities need to be encouraged to use it. This paper presents a needs assessment for Digital Interactive Storytelling (DIS) to promote Thai vocabulary learning for children with dyslexia. The assessment was conducted with teachers of children with dyslexia in both special education and inclusive schools, using the DIS needs assessment form. Based on the findings, a digital interactive story was developed from Thai vocabulary at the Grade 2 level. Illustrations, images, sounds, and interactive features such as buttons for reading and listening to the vocabulary were added. The appropriateness of the storytelling was then evaluated and tested with a sample group in the field, followed by an effectiveness evaluation of DIS in promoting Thai vocabulary learning for children with dyslexia. It is found that the average condition that should be for Thai language reading among children with dyslexia or reading difficulties was the highest level, the DIS evaluation from the experts were appropriate at the highest level, and an effectiveness of DIS with regard to promoting vocabulary learning for children with dyslexia was high level. There is a high demand for DIS, which was very suitable and effective at promoting vocabulary learning. The DIS can be used to promote reading development among children with dyslexia at the elementary level.

Keywords: Digital Interactive Storytelling; digital technology; dyslexia; Thai language vocabulary

1. INTRODUCTION

Educators encourage learners to learn at their own pace (Nash, 2023) and have equal access to learning resources (Haleem et al., 2020). The government has a policy of managing education with a learner-centered approach, and teachers must create learning for children in order to make them aware of the current

media and technology, so as to gain the maximum benefit from using them. Creative learning materials allows learners to develop themselves according to their abilities, learning without limitations. Such learning must be lifelong and continuous. The emphasis is placed on learning skills, innovation, and information skills (Ayasrah et al., 2023). Media and technology have resulted in a change in educational, with many schools adopting policies to use media and technology together to develop learners' knowledge and their ability to seek, exchange, share and disseminate information to further creativity. They can deepen their knowledge, connect with new findings in their field and become professional leaders (Sungrugsa et al., 2018). The Ministry of Education has approved a strategy for reducing inequality in education. According to this vision, "Thai citizens have quality education, knowledge, ability, skills and the potential for national development: Stable, Prosperous, Sustainable". Children in general and children at a disadvantage have access to quality education in an appropriate format (Saini et al., 2023). This ensures that all learners receive an education of the same quality and have an effective management system (Alam & Mohanty, 2023), which supports the creation of opportunities, quality, and social justice. In 2019, representatives from the Equitable Education Fund addressed the UN meeting about the multi-dimensional problem of inequality in education and asked them to review the progress of the Agenda for Sustainable Development (Chularut, 2018). Since September 2015, the main theme of 2019 has been presented as "empowering all population groups through inclusivity and empowering people and ensuring inclusiveness and equality" and "an in-depth review of the sustainable development goals in education and education inequality reduction", which the government has set as the country's policy in terms of educational institutions and demographic, economic and social aspects. Enabling all individuals to access state-provided services, regardless of their group, will help to access and utilize them effectively (Daramola, 2022). Therefore, in the establishment of policies and services that are easily accessible to the public, but for individuals with special needs, there may be difficulties in accessing them and they may not be accessible at all (Bowen & Probst, 2023). For example, some children with special needs cannot travel to school. For those who can, there may be no media in the school. This causes learning disparities between children with special needs and children in general (David et al., 2023). Therefore, education that responds to special needs must be met appropriately and must be supported, to learn and to provide effective services, media, and facilities that can enhance children's learning (Shepherd & Alpert, 2015).

For the reasons mentioned above, the research recognizes the importance of developing digital technology to provide opportunities for children with dyslexia. The provision of technology, media, facilities, and other educational services is necessary to ensure that children have equal access to the educational services provided by the state. Reading books will be a gateway for children to learn at their own pace, which will lead to stable progress (Ertzgaard et al., 2020). In addition, the development of such digital technologies is an important tool to help teachers. Stakeholders and educational personnel can access and use digital technology that is suitable for children with various types of disability, in order to develop their potential for maximum efficiency (Lersilp & Lersilp, 2019).

Therefore, the research team has studied various bodies of knowledge related to and developed digital technology using tools. This study was planned to present a needs assessment of DIS to promote Thai language vocabulary learning for children with dyslexia, the results of the development of DIS, and the results of an effectiveness evaluation for DIS with regard to promoting vocabulary learning for children with dyslexia in elementary school. The research questions in this study were as follows:

1. How does the needs assessment for DIS promote vocabulary learning for children with dyslexia in elementary school?
2. What are the results of the development of DIS to promote vocabulary learning for children with dyslexia in elementary school?
3. How do the results of the effectiveness evaluation of DIS promote vocabulary learning for children with dyslexia in elementary school?

2. LITERATURE REVIEW

2.1 Digital Interactive Storytelling

Digital Interactive Storytelling (DIS) is an application tool for reading, developed to bring consistency in designs across multiple components (Satriani, 2019). It ensures fluent reading and is of benefit for students and teachers (Nicholas et al., 2011). It can be used to boost students' interest, help discourse flow, make students remember content, overcome student reluctance or nervousness, establish rapport between the teacher and the students, as well as among students themselves, and for passing information from one person to the next, as well as from one generation to the next (Alterio & McDrury, 2004). DIS has been used in teacher education and has some advantages, particularly as a pedagogical tool. It can enable students to memorize words and improve their mastery of vocabulary. It encourages children to learn English, increases their moral

value (Satriani, 2019), provides inexpensive media for a rich language experience (Wright, 1995), and increases students' interest in reading (Slattery & Willis, 2001; Wright, 1995). DIS can help students reading faster by themselves (Rowsell & Pahl, 2014). These DIS creation applications and websites, combined with visual and audio, have assembled a collection of original or curated content ranging from photos, drawings, and images to audio and video clips (Flórez-Aristizábal et al., 2019). In some cases, there is even animated text. DIS has been used as a teaching tool in teacher education. While DIS could conjure images fantastical tales which are certainly best options (Ezeh, 2019), it is also important to think beyond narratives to learning the vocabulary of any story, and beyond student development reading (Lucarevschi, 2016; Miller & Pennycuff, 2008).

2.2 Children with dyslexia

Children have impairments in remembering consonants, vowels, and lack spelling skills, so they cannot read or read slowly, cannot read aloud, and cannot conjugate tonal sounds. Cross read high words to understand the unreadable subject (Weber et al., 2023). This group of children has at least a lower reading ability than children of the same age (Special Education Bureau, 2009) and 2-year level dyslexia (Soonprasit, 2018). Problems of dyslexia is used to describe the characteristics of children who have difficulty developing their academic, linguistic, and written learning potential because of abnormal functioning of the brain in the process of perceiving and communicating information. This makes it difficult for them to study and they can fall behind children of the same age.

2.3 Dyslexia with Thai language vocabulary

Reading is a thought process for receiving information. Therefore, it is a behavior whereby learners acquire knowledge. Reading also helps in developing oneself physically, mentally, intellectually, and emotionally and is an important basis for life (Biswas, 2023). Schools should, therefore, promote reading as an important foundation for children. They should be eager to learn from reading and use reading in their lives. Promoting reading in schools in the digital age takes many forms, such as creating storytelling video clips, telling stories from books, or introducing books by creating video clips telling stories about books, or organizing reading competitions (Tabernero-Sala et al., 2024). Reading activities can be organized through social media and it can also be used to help publicize activities and encourage reading for children, such as preparing bibliographies or annotations of new books and allowing children to participate in creating an anthology of their own favorite books, such as posting on the school's Facebook fan page, or personal Facebook posts to encourage interest in reading (Chaimin & Yuangsoi, 2019). However, reading vocabulary is difficult for children with dyslexia, because these children have limited knowledge of vocabulary and arrange words into sentences incorrectly (Arayawinyu, 1999). The Thai language is unique in that it has its own writing system, alphabet, and characters that are not found in any other language (Hengsanankun et al., 2023). It also differs from certain local languages in terms of grammar. Additionally, when some words are heard aloud, some children may not be able to distinguish between them due to the tone system. The blend of Thai vowels, consonants, and tones is crucial, since it is almost impossible for children (Götz, 2023), especially those with dyslexia, to distinguish between the distinct tones. Certain words become harder to understand when their tones shift because they lose their meaning.

Addressing reading difficulties in children with dyslexia typically begins with auditory exposure to vocabulary. This is followed by learning to read, comprehend, and correctly pronounce each word. When children with learning disabilities are able to hear the pronunciation, while simultaneously encountering the vocabulary visually, this supports their ability to connect the word form with its meaning and apply it correctly in context. Therefore, the integration of digital reading technologies is a highly effective approach to enhancing vocabulary acquisition and reading development in children with reading impairments.

For example,

- The DIS tool bridges communication gaps in inclusive classrooms, particularly in content-heavy subjects.
- Visual + sign language integration enhances concept retention and academic performance.
- Tools like DIS foster inclusive education by making learning accessible, engaging, and empowering for students with hearing loss.

3. METHODS

3.1 Participants

The 46 participants consisting of 1) the 10 teachers who teach children with dyslexia, and the 10 teachers who teach children with disability in special education schools and inclusive schools, both co-educational schools, inclusive schools with purposive sampling for needs assessment of DIS to promote Thai

language vocabulary learning for children with dyslexia; 2) the 6 children with dyslexia who are studying in Grade 2 in disability-specific schools, co-educational schools, inclusive schools with purposive sampling to study the preliminary developmental testing of DIS to promote Thai language vocabulary learning, and 3) the 20 children with dyslexia who are studying in Grade 2 in disability-specific schools, co-educational schools, inclusive schools for study the actual developmental testing of the DIS to promote Thai language vocabulary learning and assess the ability of children with dyslexia to read Thai vocabulary.

3.2 Research tool

The research tools used to collect the data were a DIS needs assessment form to promote Thai language vocabulary learning for children with dyslexia. Evaluating the form for the Index of Item Objective Congruence examination and verification of content were conducted by five experts who discovered that all IOC investigates got results that were at or above 0.89 and then put the needs assessment form to the test by getting actual information from ten teachers that matched the sample and using the Alpha Coefficient calculation to examine the evaluation form's reliability, giving a whole scale of 0.94., and DIS to promote Thai language vocabulary learning developed according to ADDIE's learning media development process and the Universal Design for Learning's principles for developing media for the disabled, consisting of 3D cartoons animation with games, Thai vocabulary and vocabulary sounds. A total of ten stories were evaluated and recommendations were given by 7 experts dealing with children with dyslexia. The evaluation results were appropriate at the highest level, then improved according to suggestions. Preliminary developmental testing was carried out with three children with dyslexia according to the criteria for calculating the efficiency of the process (E1) and the efficiency of the product (E2). Then actual developmental testing with 20 children with dyslexia was conducted and 3) an ability assessment form was used to assess the ability to read Thai vocabulary among children with dyslexia, with a rating scale of five sets. Each set consisted of five vocabulary words, one for point each. A full score of 5 points, totalling 25 points was evaluated for appropriateness by five experts. It can be edited and improved so that it is ready for use.

3.3 Data collection

Data collection was divided into three parts: 1) a needs assessment of DIS with a sample of 20 teachers, 2) developing of DIS to promote Thai language vocabulary learning, and 3) developmental testing consisting of (a) preparation before studying the developmental testing of DIS: the researchers obtained a letter of permission and a letter of consent to participate in the research from the children's parents and prepared the research tools; (b) preliminary developmental testing with a sample of 6 children according to the criteria for calculating the efficiency of the process (E1) and the efficiency of the product (E2); (c) actual developmental testing with 20 children. It was possible to assess the children's ability to read Thai vocabulary at the Grade 2 level before learning with DIS, and (d) assessing the children's ability to read Thai vocabulary at the Grade 2 level after learning. The evaluation results were collected according to the activity schedule, using the results to analyze the ability to read Thai vocabulary. The experiment was conducted as planned for five weeks, three days per week, 30 minutes per day, a total of fifteen times.

3.4 Data analysis

Data analysis was divided into four parts: 1) a needs assessment of DIS with mean and standard deviation following the criteria whereby 4.51–5.00 shows that there is the highest level, 3.51–4.50 has a high level, 2.51–3.50 has moderate level, 1.51–2.50 has a low level, and 1.00–1.50 has the lowest level; 2) analyzing the Modified Priority Needs Index Technique by specifying that D = Realistic Condition and I = Expectation Condition, by finding the difference between the Expectation Condition and the Realistic Condition and using the results to prioritize needs; 3) analyzing the development results of DIS with preliminary developmental testing by calculating the efficiency of the process (E1) and the efficiency of the product (E2) at 80/80, and 4) analyzing the development results of DIS with actual developmental testing, which analyzes each group's ability to read Thai vocabulary by comparing the mean scores before and after learning with a t-test.

4. RESULTS

Learning for children with dyslexia presents the results followed by the three research questions:

4.1 Needs of DIS to promote Thai language vocabulary learning for children with dyslexia

According to preliminary data for drafting the DIS, the total sample was 20 teachers. 17 females and 3 males, 31–40 years old. Most of them work as teachers in disability-specific schools: co-educational schools, combined schools, and schools for children with dyslexia.

Table 1: Mean and SD of needs of DIS to promote Thai language vocabulary learning for children with dyslexia

Needs of DIS to promote Thai language vocabulary learning for children with dyslexia	Realistic condition (D)			Expectation condition (I)		
	M	*SD*	Level	*M*	*SD*	Level
1. The school has a dedicated application for reading Thai that is suitable for children with dyslexia	2.10	0.24	Low	4.24	0.41	High
2. The school has trained teachers to use a specific application for reading in Thai that is suitable for children with dyslexia	2.45	0.12	Low	4.63	0.20	Highest
3. The school has activities to promote Thai language reading using the application	2.10	0.24	Low	3.61	0.41	High
4. The school has a dedicated application for reading Thai that is suitable for children with dyslexia	1.55	0.51	Low	4.27	0.26	High
5. The school has promoted the use of applications specialized in reading Thai that are suitable for children with dyslexia	1.71	0.50	Low	3.41	0.42	Moderate
6. Teachers have integrated Thai reading applications that are suitable for children with dyslexia	1.65	0.51	Low	4.39	0.38	High
7. The instructor has a Thai reading application that is suitable for children with dyslexia in reading and practicing elementary reading skills in Thai	2.10	0.46	Low	4.29	0.50	High
8. Teachers are proficient in using specific applications that are suitable for children with dyslexia	2.25	0.63	Low	4.52	0.45	Highest
9. Teachers design the elementary learning of Thai reading by using the application to help children with reading disabilities or difficulties	2.09	0.55	Low	4.50	0.37	High
10. One can seek applications to promote the learning of elementary Thai language reading for children with depletion or reading difficulties	2.01	0.40	Low	4.37	0.46	High
Mean	**2.00**	**0.42**	**Low**	**4.22**	**0.39**	**High**

Table 1 shows the Realistic Condition (D) for DIS to promote Thai language vocabulary learning for children with dyslexia. Overall, it is at a low level, while the Expectation Condition (I) of DIS to promote Thai language vocabulary learning for children with dyslexia is at a high level.

Table 2: Needs of DIS to promote Thai language vocabulary learning for children with dyslexia

Needs of DIS to promote Thai language vocabulary learning for children with dyslexia	Children with dyslexia	
	$PNI_{modified}$	Level
1. The school has a dedicated application for reading Thai that is suitable for children	1.02	6
2. The school has trained teachers to use a specific application for reading in Thai that is suitable for children	0.89	9
3. The school has activities to promote the Thai language reading using the application	0.72	10
4. The school has a dedicated application for reading the Thai that is suitable for children	1.75	1
5. The school has promoted the use of applications specialized in reading Thai that are suitable for children	0.99	8
6. Teachers have integrated Thai reading applications that are suitable for children	1.66	2
7. The instructor has a Thai reading application that is suitable for children	1.04	5
8. Teachers are proficient in using specific applications that are suitable for children	1.01	7
9. Teachers design elementary learning of Thai reading by using the application to help children with reading disabilities or difficulties	1.15	4
10. One can seek applications to promote the learning of Thai language reading for children with depletion or reading difficulties	1.17	3
Total	**1.11**	**-**

As is clear from Table 2, when considering the needs of DIS to promote Thai language vocabulary learning for children with dyslexia it was found that "The school has a dedicated application for reading Thai that is suitable for children" was the number one priority, second only to "Teachers have integrated Thai reading applications that are suitable for children". However, the needs of DIS to promote Thai language vocabulary learning for children with dyslexia have "One can seek applications to promote elementary Thai language reading learning for children with depletion or reading difficulties" with needs ranked 3rd.

4.2 The results of the development of DIS to promote vocabulary learning for children with dyslexia

It was found that the actual use of applications is low. The average condition that should be for Thai language reading among children with dyslexia or reading difficulties was the highest level, as shown in Table 1. We therefore drafted a story and developed 15 DIS with texts, sounds, animations, interactions, and appropriate pictures to stimulate reading in early elementary school children. It is also designed to include Thai language for children to learn vocabulary, as shown in Figure 1 and Figure 2. we found that the average value was 4.89, meaning it had the highest level of suitability.

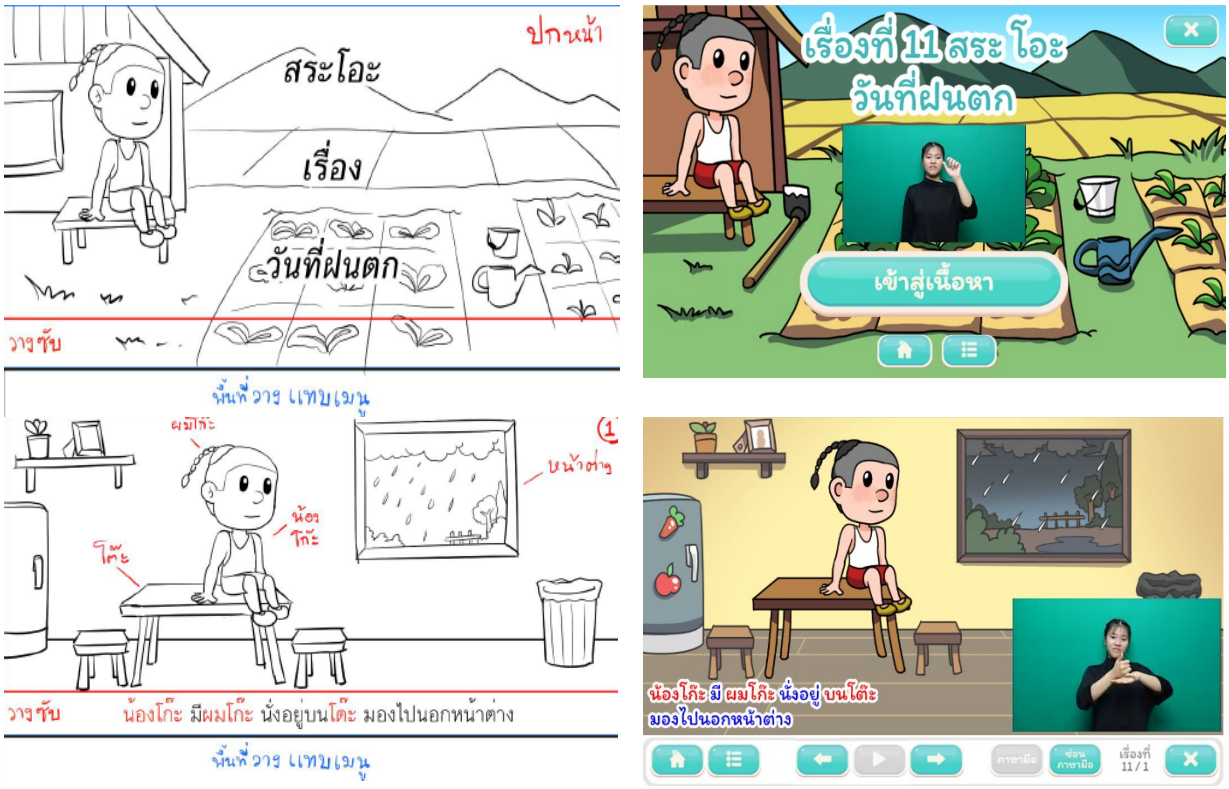

Figure 1: Drafted and developed digital interactive storytelling (Hongngam et al., 2024)

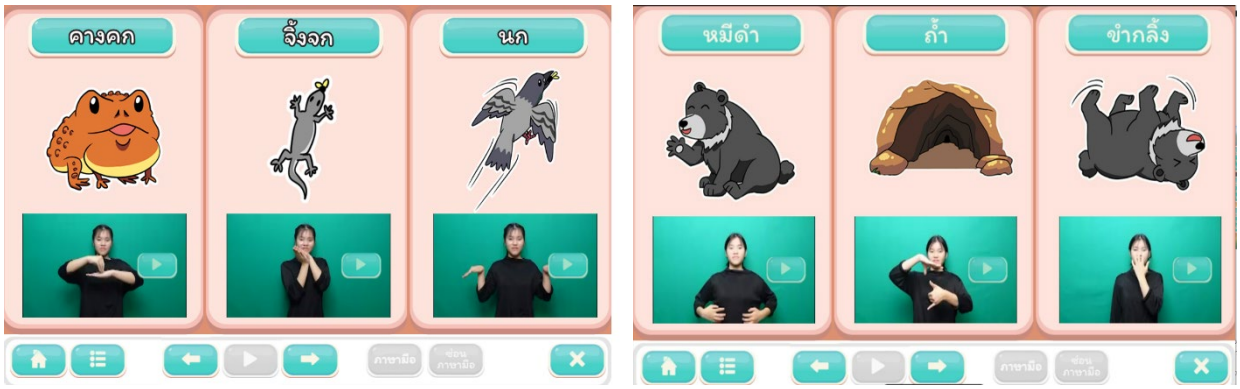

Figure 2: Example of promoted language for children

4.3 The results of developmental testing of DIS to promote vocabulary learning for children with dyslexia

The result of developmental testing of DIS shown in Figure 3, found that most of them had lower assessment scores before studying than after studying and had a low score during the first study, but there was an increase in scores on the second time and the highest in the third time in every story. The scores were used to calculate the efficiency of the process (E1) and the efficiency of the product (E2) of the DIS to promote

vocabulary learning by specifying E1 = 80 and E2 = 80. It was found that there was a score of E1 = 81.2 and E2 = 84.5, meaning that the score for the efficiency of the process (E1) using DIS to promote vocabulary learning was higher than the specified criteria and the score of the efficiency of the product (E2) using DIS to promote vocabulary learning was also higher than the specified criteria. Therefore, it can be concluded that DIS is highly effective.

Figure 3: Developmental testing of digital interactive storytelling

When the average scores were tested by t-test, the comparison revealed that the children's ability to read Thai vocabulary at Grade 2 level before and after learning had a statistical difference of 0.01. The mean scores acquired after learning were higher than those of before learning, as shown in Table 3.

Table 3: The average scores of children with dyslexia before and after learning

Comparison	N	Sum	*M*	*SD*	t	df	*p*-value
Before learning	10	30	3	1.11	50.2	9	0.00***
After learning	10	169	16.9	0.32			

****p* < .01

The developed DIS has also been used to develop language skills in deaf /hard of hearing children and found that most of them had lower assessment scores before studying than after studying and had a low score during the first study, but there was an increase in scores the second time and the highest on the third occasion in every story. The scores were used to calculate the efficiency of the process (E1) and the efficiency of the product (E2) of the DIS in promoting vocabulary learning by specifying E1 = 80 and E2 = 80. It was found that there was a score of E1 = 80 and E2 = 80.5, meaning that the score of the efficiency of the process (E1) using DIS to promote vocabulary learning was higher than the specified criteria, as was the score of the efficiency of the product (E2). Therefore, it can be concluded that DIS to promote vocabulary learning for children is highly effective.

When the average scores were tested by t-test, the comparison of the results revealed that the children's ability to read Thai vocabulary at the Grade 2 level before learning and after learning were statistically different at 0.01. This means that the mean scores acquired after learning were higher than those before learning, as shown in Table 4.

Table 4: Compare the average scores of children with deafness/hard of hearing

Comparison	N	Sum	*M*	*SD*	t	df	*p*-value
Before learning	10	20	2	0.89	44.8	9	0.00***
After learning	10	161	16.1	1.34			

****p* < .01

5. DISCUSSION

The DIS developed can be used to promote reading for children with dyslexia (Ågren et al., 2023). Each story that a child reads will allow them to learn words and understand the meaning of those words from pictures and Thai language communicated through animation. There was a statistically significant difference in pre-test and post-test scores of 0.05 for both groups of children. It can promote children's effective Thai reading development. It is clear that another technique which can help in the learning of children with special needs is using technology to help learning data processing (Ussenova et al., 2022). It is a combination of educational technology and multimedia features that contribute to learning. DIS or multimedia lessons, which present information with computer animations, sounds, and interactions with feedback from a game in each lesson are considered a reinforcement that enables learning (Mantilla et al., 2023). Providing feedback not only lets learners know if they are right, correct but also motivates them to learn in accordance with Saenboonsong et al. (2018), who points out that technology is being used to improve learning. It is necessary to use diverse and interesting media to sustain learner's attention, this enables them to concentrate on learning and self-development effectively. DIS is a good option for transforming abstractions into something concrete and encouraging learners to learn according to their own abilities. In addition, with the subjects who tried it, the researchers were satisfied with the illustrations in the prepared media because they were fun. It is not boring to teach differently from learning from textbooks (Zainuddin et al., 2022).

In addition to DIS helping children with dyslexia's language development, it was also found that after the use of the DIS, the average behavior that promotes the development of language comprehension among caregivers increased significantly. Child caregivers had the highest level of satisfaction with the language application overall, this is consistent with the results of a study on language development by monitoring and promoting early childhood development by Jantanavivat et al. (2022), which found that after caregivers participated in the project, the attitudes and behaviors of caregivers significantly improved. Designing language comprehension goes from easy to difficult, which encourages participants to learn and practice online exercises. It also helps to see the results immediately. As a result, they know what stage they are progressing to and how they need to correct their deficiencies (Nami, 2020).

The development of DIS is a tool to prevent many other disabilities to diagnose children with special needs in the first place when problems are found (Early Detection) and proper planning for both medical and educational assistance (Early Intervention) will help mitigate the consequences (Special Education Bureau, 2007). It also allows children to continue learning in a different way from their peers and to integrate researchers well with others in society and in accordance with tailored design to meet the needs of children to with special needs focus on reading freely. There are also exercises that respond to disabilities as researchers well as promote cognitive and correct reading skills. They give children the ability to learn. Singsoda and Nillapun (2016) present three principles of teaching reading in Thai: teaching the ability to read, aloud teaching to read correctly, and teaching how to read. In this research, such principles have been applied to help children to read. Therefore, learning management for children with reading disabilities is necessary to provide a variety of learning arrangements to meet the learning methods of each learner (Ministry of Digital Economy and Society, 2018).

6. CONCLUSION

The development of DIS is suitable and highly effective. Designed for both general use and the Thai language, it can be used to promote reading development for children with dyslexia. Primary education and educational technology are designed together to meet the special needs of children. Focused on reading freely, it is a pleasure to read, and there are also exercises that respond to special needs. Teachers and parents can also be encouraged to gain the correct reading skills. This gives the children the ability to read and will lead to reading for research.

In the future, the findings of this research should be applied to the development of artificial intelligence (AI)–based tools that support pronunciation and spelling instruction in accordance with the rules of the Thai

language. Such tools could allow students to listen to recordings of their own reading to check pronunciation accuracy and spelling correctness. This approach has the potential to significantly enhance the reading and spelling abilities of children with learning disabilities (LD). For example, Future studies could replicate this research across:

1) Different educational levels, including early childhood education, secondary, and vocational training.

2) Various geographic regions, such as rural or under-resourced schools in Thailand, where access to Thai language resources may be limited.

3) Multilingual contexts, exploring how DIS can be adapted to support Thai language learners who use ethnic or regional Thai language dialects.

4) Integration with Emerging Technologies. The platform could be enhanced through:

- Artificial Intelligence (AI) to offer real-time sign translation or adaptive sign suggestions based on the learner's profile.
- Augmented Reality (AR) to allow 3D modelling of signs and real-world object interactions.
- Gamification to increase engagement, especially among younger users.

In order to deepen the evaluation of the Digital Inclusive Sign (DIS) tool, feedback was collected from both students and teachers who used the platform during classroom instruction. These insights offer a more nuanced understanding of how the tool supports inclusive learning beyond quantitative outcomes.

Regarding student reflections, children with learning disabilities expressed enthusiasm about the visual and interactive nature of the DIS tool:

> "I like watching the videos because they show me how to sign difficult words. I can practice again and again at home." (Ploy, Grade 4 student with moderate disabilities)

> "Now I understand science better. I can explain things to my friends using vocabulary and pictures." (Nam, Grade 5 student using Thai language)

These responses suggest that the tool not only improves comprehension, but also fosters independence and confidence in communication.

The qualitative data underscore the value of the DIS tool, not only as a learning aid, but also as a social inclusion mechanism, encouraging interaction, peer learning, and student agency. These human-centered experiences validate the tool's usability and emotional impact in real classroom contexts.

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