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Reading-Kit: Phonic4dyx to Improve Reading Skills among Students with Dyslexia

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Abstract

Children with specific reading disability often experience difficulties to recognise letter shapes and sounds, identify syllables, read words and understand sentences. Being able to read enables lifelong learning and serves as a source of knowledge. Yet, there are limited reading materials that includes children's visual, audio, kinaesthetic and tactile skills. The objective of the study is to develop PHONIC4DYX kit by incorporating multisensory elements and technology to enhance consonant-vowel-consonant reading ability among children with dyslexia. Five students with dyslexia from Bangi Dyslexic Centre were chosen to take parts in this study. The implementation of PHONIC4DYX among the participants showed a positive effect on the participants in terms of reading CVC words. PHONIC4DYX is developed for children with dyslexia who has mastered phonic sound of letters but yet to master the blending of the sound to form words. It is suitable for children with dyslexia who have difficulties in identifying the letter sound, naming the letter sound and blending of the individual phonic sound.

Keywords: Dyslexia, Multisensory, Reading Kit, Special Education

Introduction

Proficiency in reading, writing and, using numbers provide lifelong learning opportunities. These literacy skills empower and liberate people. Statistics by UNESCO shows that 763 million of adults still cannot read and write, with 617 million of them are children. The Strategy for Youth and Adult Literacy (2020- 2025) and Global Alliance for Literacy are two most important agendas to improve literacy among the world population (UNESCO). Reading skill is a source of knowledge to be mastered in order to gain knowledge. It is a form of communication where feelings, ideas and statements are conveyed by the writer to the reader in the form of language symbols (Ahmad & Othman, 2020). Reading is a complex process which involves observation, visual sensory, linguistic, and mental processing (Rahmat & Khairuddin, 2023). Domains such as recognizing letter shapes, letter sounds, syllables, reading meaningful words and reading sentences are the basis of reading skills (Ahmad &

Othman, 2020). According to Ting and Kutty (2022), the reading skills helps a person to express opinions and feelings. Therefore, reading is seen as an important parameter in the language development of every child.

Children who often face problems in reading ability are known as dyslexia. Dyslexia origins from the Greek words 'dys' meaning difficulty and 'lexia' meaning word. Dyslexia is a disorder of children's brain development that affects children's reading skills. Dyslexia is a reading disability that affects the ability to read words and organize words despite having a normal level of intelligence and given sufficient educational opportunities and with no vision or hearing problems (Gustianingsih et. al, 2021). Children with dyslexia have problems connecting visual symbols with sounds (Samsudin & Alias, 2021). According to Vijayaletchumy and Kavenia (2022), children with dyslexia do not have the ability to read and write like normal children in language-focused formal education. Apart from reading disorders, children with dyslexia are also often associated with the inability to button a shirt, jump (hop & skip), tie shoelaces and wear shoes upside down, kick a ball, understand instructions (Samsudin & Alias, 2021). In terms of reading skills, children with dyslexia face problems in naming letters, sounding out the sounds of letters, syllables, reading words, reading in reverse, i.e. 'batu' (stone) is read as 'tuba' and 'lagu' (song) is read as 'gula' (sugar). They are also often associated with the problem of writing backwards, messy writing, unclear and reversed speech and difficulty pronouncing long words (Samsudin & Alias, 2021). Children with dyslexia are often labeled as lazy, not industrious, and not interested in the language subject (Romero, 2020). According to Samsudin and Alias (2021), as many as 4-8% of primary school students are dyslexics.

Early diagnosis and intervention are important aspects that parents and teachers should pay attention. Teachers play an important role in identifying children with dyslexia and providing early intervention in the school environment. Basically, dyslexia symptoms are difficult to be identified by parents and teachers since these children post the same intelligence as other children (Puspitaloka & Ermanto, 2020). In 2021, Samsudin and Alias reported that parents are lacking in knowledge and information about dyslexia which causes delays in assessment and intervention which eventually leads to securing lower scores in exams compared to their peers, unstable emotions, and low self-esteem. According to Yuzaidey and friends (2018), once a child is suspected of dyslexia, the child should be referred to a child pediatrician or child psychiatrist for an initial diagnosis before being confirmed by a clinical psychologist through further testing.

In Malaysia, modules and interventions for children with dyslexia are limited, as there is no standard module for students with dyslexia to use in the classroom during teaching and learning (Yuzaidey et. al., 2018). Apart from that, teachers in government schools still use traditional methods to teach children with dyslexia in their classes because they lack expertise and knowledge about dyslexia (Yuzaidey et. al, 2018). Traditional teaching techniques practiced in schools are not suitable for students with dyslexia (Sudek & Encinas, 2019) as they are less effective for children with dyslexia because they are more teacher-centered and the students are rather passive, bored and are unable to concentrate. Teaching English as a second subject requires expertise and non-traditional teaching methods (Puspitaloka & Ermanto, 2020). Multisensory methods can be used to increase the involvement of students with dyslexia in teaching and learning. In 2020, Puspitaloka and Ermanto suggested that the

use of multisensory methods can improve reading ability among students with dyslexia. Multisensory activities in T& L uses more than one sense at a time and they are also known as VAKT (visual, audio, kinesthetic, touch).

In Malaysia, studies on methods to improve English reading skills among students with dyslexia are still lacking compared to Malay language. So, in this study, a kit that uses multisensory elements in a technological platform was developed to help students with dyslexia improve their reading ability in English. The developed kit, 'PHONIC4DYX' focuses on reading skills via phonic method and spelling of CVC words.

Objective

Special education teachers need to use appropriate teaching methods for students with dyslexia at school as they play an important role to improve reading skills among students with dyslexia. Teaching students with dyslexia, a second language, English is a situation that requires expertise and non-traditional teaching methods (Puspitaloka & Ermanto, 2020). Multisensory activities in T& L uses more than one sense at a time and the use of this method in T&L in class can give students the opportunity to participate in learning (Romero, 2020). Apart from that, the multisensory approach can also stimulate all the senses in students to take part in reading activities (Lee & Bakar, 2022). The multisensory approach in T&L can improve students' memory and facilitate students' learning process (Rostan et. al, 2020). Incorporation of all the senses at a certain time can increase the level of concentration of students with dyslexia towards learning. In Malaysia, studies on methods to improve English reading skills among students with dyslexia are still lacking compared to Malay language. So, in this study, a kit that uses multisensory elements in a technological platform was developed to help students with dyslexia improve their reading ability in English. The developed kit, 'PHONIC4DYX' based on reading skills via phonic method and spelling of Consonant- Vowel-Consonant (CVC) words. The effect of the kit on the reading and spelling ability of students with dyslexia is evaluated by using pre- and post- tests.

Literature Review

Multisensory Elements

Multisensory methods increase the involvement of students with dyslexia in teaching and learning. Literacy attainment for English language can be predicted by looking alphabetic knowledge which involves names and sounds of printed letters along with phonological awareness. Early literacy skills can be taught by pairing letterforms and sound of letters. This is more effective than purely auditory- based teaching and learning (O'Brien et. al, 2022). In multisensory teaching in a language subject, picture cues are integrated with letter sounds. This method incorporates more than one sense and effective for teaching second language. All children differ among themselves according to their preferred sensory channel for the learning process . Some children learn better through visual aid, some learn better through auditory aid. Children have high ability to learn through incorporation of different sensory channels such as sense touch, sight, hearing, and movement (Rasheed, 2022). Human uses these senses to receive and perceive information from surroundings and uses this information in the process of learning (read and write) (Malčík & Miklosikova, 2016). Multisensory also known as VAKT method is the best teaching method for students with dyslexia (Cahyana et. al, 2021).

Table 1
Multisensory Elements for Learning Approaches (Jalil et. al, 2018)

Senses	Aspects
Visual	Use the eyesight to see information, reading, visualization or recording mental images, and memorizing
Auditory	Involve listening and talking through various ways such as rhyming and phonemic
Tactile	Involve touching with hands and fingers while engaging fine motor skills
Kinesthetic	Involves motion while engaging fine and gross motor skills. Example: jumping, running and placing. Happened together with tactile elements

Theory of Information Processing Learning

This theory was pioneered by Robert M. Gagne (1975). According to this theory, learning is a situation that involves information processing (Suryana et. al, 2022). According to this theory, learning (in the form of stimulation) is received from the environment through the human senses (visual, auditory, kinesthetic and tactile). Information received is stored in short-term or long-term memory. Information stored in long-term memory will be used for new learning processes. When the child needs the information, the information will be searched and the response shown based on the stored information (Guo, 2018).

Vygotsky Theory

This theory was pioneered by Lev Vygotsky. This theory is a socio-cultural theory that emphasizes interaction with the environment. According to this theory, a child's learning occurs through the child's interaction with the environment. Interaction with the environment (human or physical) will affect the cognitive development of a child (Abdullah et al, 2019). Lev Vygostsky introduced the Zone of Proximal Development (ZPD). This zone is the development of a child with help from the environment (Harun et al, 2022). Help from the environment is in the form of guidance from friends, teachers or learning aids. The help and guidance given is known as scaffolding. According to Vygotsky's theory, scaffolding is very important to help special education children to master the skills they have not yet mastered with the help of adults (teachers or parents) and more skilled peers.

Skinner's Operant Conditioning Theory

This theory was founded by B.F. Skinner. This theory is one of the theory of behaviorism. This theory emphasizes the concept of positive and negative reinforcement. Positive reinforcement according to this theory is rewards, prizes, praise and tokens while negative reinforcement is withdrawn rewards and verbal reprimands.

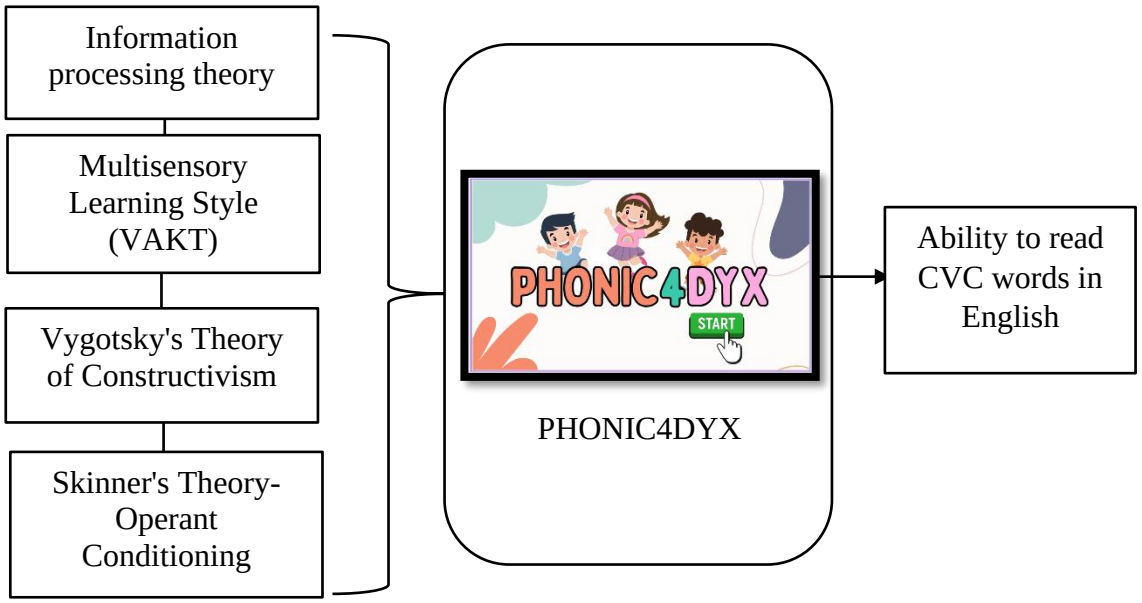

Figure 1: Theoretical framework for *PHONIC4DYX*

Methods

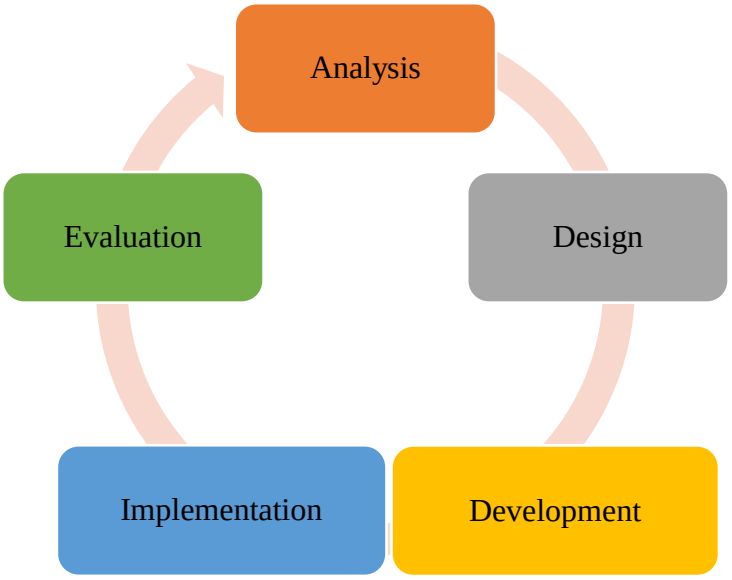

Figure 2: ADDIE model

The PHONIC4DYX kit is built based on the ADDIE model (figure 6) which involves five phases namely, analysis phase, design, development, implementation and evaluation. This model is often referred to by researchers who intend to design a teaching model (Azahari et. al, 2023). The 1st stage involves the problem identification, goal of the application or kit and the target users are identified. The goal of this kit is to improve reading skills among students with dyslexia. Multisensory elements are incorporated in this kit to improve CVC reading ability among students with dyslexia. In the 2nd phase, design of kit takes place. CVC word pictures are selected based on the selected words. All the selected pictures are real pictures, to avoid confusion among students with dyslexia. The display screen is designed not to have extreme

colours to avoid lack of concentration among students with dyslexia. Word displayed on the screen resemble real hand writing to avoid confusion.

Figure 3: Phonic4dyx

For the development phase, CANVA and sound recorder software were used to develop this kit. Phonic style was used to record the sound of the works. In the fourth phase, PHONIC4DYX kit was used to evaluate the reading ability of students with dyslexia at a selected location. Five participants from Malaysian Dyslexic Center (PDM) Bangi branch were chosen to take part in this research. Purposive sampling was used to select the participants to take part in this study.

Pre and Post Test

Before and after the intervention using the PHONIC4DYX kit, the students with dyslexia were given a pre-test and a post-test to evaluate the level of reading ability of the students with dyslexia who participated in this study. The students' scores in the pre-test and post-test reflects the level of the students' reading ability. The pre- and post-test used are the same test for comparison purposes. In the test, students' skills in reading CVC words are tested. Apart from that, the students were also asked to read and choose the correct CVC word based on the picture. The third activity in the test is that students are asked to choose a picture based on the displayed CVC word.

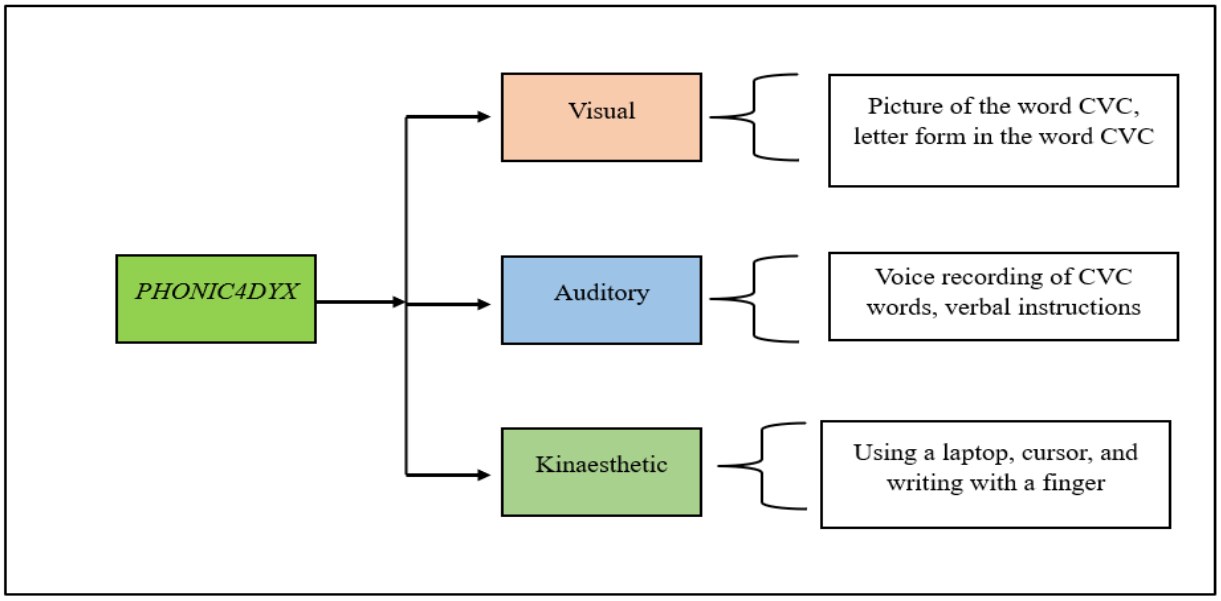

Figure 4: Multisensory elements in PHONIC4DYX

Results and Discussion

Table 2

Pre and Post-Test Results

Student	Section A		Section B		Section C			
	Pre	Post	Pre	Post	Pre		Post	
Student 1	mat fan can mop	mat fan can mop	bag hat mop cat	bag hat mop cat	bed can cat bus van	jam mop bag zip pin	bed can cat bus van	jam mop bag zip pin
Student 2	mat fan can mop	mat fan can mop	bag hat mop cat	bag hat mop cat	bed can cat bus van	jam mop bag zip pin	bed can cat bus van	jam mop bag zip pin
Student 3	mat fan can mop	mat fan can mop	bag hat mop cat	bag hat mop cat	bed can cat bus van	jam mop bag zip pin	bed can cat bus van	jam mop bag zip pin
Student 4	mat fat can mop	mat fat can mop	bag hat mop cat	bag hat mop cat	bed can cat bus van	jam mop bag zip pin	bed can cat bus van	jam mop bag zip pin
Student 5	- fan can mop	mat fan can mop	bag hat mop cat	bag hat mop cat	bed can cat bus van	jam mop bag zip pin	bed can cat bus van	jam mop bag zip pin

Student 1 is a 10 year old Malay boy can read CVC words with minimal guidance. His computer skills are also very good and the sample did not seem to be clumsy when operating PHONIC4DYX. Student 1 can pronounce the phonics souund of letters without guidance. However, student 1 is still confused with the sound /i/ and /e/ as well as the sounds /n/ and /m/. The skill of spelling CVC words with the phonics method is also at a good level. Student 1 uses the medium of English to communicate at home. This factor makes the student's English proficiency at a good level and makes student 1 comfortable throughout the activity. The results of the pre-test and post-test also show that the CVC reading skills in PHONIC4DYX is easy for his level. In addition to the English proficiency, student 1 is also at an age level that has mastered many simple English words. Student 1 showed good cooperation, interest, and focus throughout the activity. Student 1 also did not show clear dyslexic characteristics during the trial phase.

Student 2 is also a male Malay student who is 11 years old. Student 2 can complete the pre-test worksheet well and read CVC words correctly. Student 2 showed interest in the PHONIC4DYX application. For an 11-year-old child, student 2 seemed comfortable using the computer. He seemed to be calm and can follow instructions well. Student 2 can also sound the phonics well during the intervention process. Student 2 completed the task quickly and without guidance. The dyslexic characteristics were also not visible throughout the process. The sample can write neatly.

Next, student 3 is a 10 years old Malay male student. Student 3 needed guidance from the teacher throughout the intervention. Student 3 can concentrate throughout the intervention phase. Student 3 can distinguish phonic sounds. In addition, the student's spelling skills are also at a good level. Student 3 can read all the CVC words before and after the intervention of PHONIC4DYX is executed. Overall, student 3 showed good achievement and did not show any significant dyslexic characteristics.

Student 4 is a Malay female student who is 6 years old. Student 4 is the youngest participant whom is able to use PHONIC4DYX. Student 4 can answer the pre-test but failed to identify the word 'fan' in question A, instead chose the word 'fat'. Part B is well answered. Student 4 can recognize pictures and words well. For part C, students cannot read the words 'bus' and 'pin'. After the implementation of the PHONIC4DYX intervention, student 4 still experienced confusion in reading the word 'fan'. Student 4 managed to read all the words in question C well. Sample showed interest when using PHONIC4DYX reading kit and can operate the computer without guidance. During the intervention, the student can sound the phonics and can concentrate well. The achievement shown by student 4 proved that the student has mastered CVC reading skills well through PHONIC4DYX but needs more reading practice.

Student 5 is a Malay male student who is 9 years old. Student 5 showed unsatisfactory performance in the pre-test. Student 5 could not read the word 'mat' in part A, rather looked confused while working on the pre-test. Student 5 had difficulty reading the words 'bed', 'jam' and 'can' during the pre-test. Student 5 showed interest in learning to read using PHONIC4DYX. There are letter sounds that are not mastered but student 5 could follow the sound of the letters while using PHONIC4DYX. After the intervention of PHONIC4DYX, student 5 has shown an encouraging improvement. Parts A and B were answered correctly while in

part B, student 5 only had difficulty reading the word 'pin'. Student 5 was able to follow instructions well and showed some dyslexic characteristics such as confusion and unclear writing. Student 5 showed some shyness and restless character during the session. Sample post low self-confidence at times.

All students were found to have good computer skills. The instructions given were easy to understand and students did not experience difficulties while using PHONIC4DYX reading kit. In addition, the selected sample post good communication skills in English. The students use English as a medium of conversation at home. Therefore, the students can easily understand and master the skills of reading CVC words. Pre- and post-tests were built based on the level of reading skills to be tested. Students obtained high scores before and after the intervention because they had mastered reading skills using phonics well. PHONIC4DYX focuses on students with dyslexia who are still in the phase of getting to know phonics sounds. The PHONIC4DYX reading kit is more suitable for students who do not have the ability to communicate in English and have weak ability to sound out letters using the phonics method.

The implementation of the PHONIC4DYX intervention has different effects on each student. Students with dyslexia at the Malaysian Dyslexia Dyslexia Association Bandar Baru Bangi branch have a higher level than the teachers expected. PHONIC4DYX was built to help children with dyslexia who have a lower level such as in the Integrated Special Education Program (PPKI) at school. Students with dyslexia placed at the Malaysian Dyslexia Center have problems mastering writing, reading and counting skills (3M). Nevertheless, their cognitive level is at a normal level and they do not have other disadvantages. Various disabilities can affect students' mastery of reading skills. The combination of various categories in the PPKI class makes the achievement of students with dyslexia likely to be disrupted due to differences in cognitive levels. Teachers are forced to use the same intervention method for various categories of students with learning problems, making learning outcomes different for each individual. The constraints faced affect student achievement. Because the dyslexia center only accommodates only students with dyslexia, the planned teaching techniques and strategies were clearer and more focused.

Conclusion

Multisensory methods, which engage multiple senses like sight, sound, touch, and movement, are highly effective for improving reading skills in dyslexic students. By combining visual (seeing letters), auditory (hearing sounds), tactile (touching letters), and kinesthetic (moving while learning) elements, students reinforce their understanding of letter-sound relationships and improve word recognition. This approach helps dyslexic learners form stronger connections and enhances memory retention, making it easier for them to recall information when reading (O'Brien et al., 2022). This research enhances existing knowledge by emphasizing the importance of multisensory approaches in teaching dyslexic students, particularly in literacy development. While previous studies have explored various methods for improving reading in dyslexia, this research underscores the effectiveness of combining multiple sensory channels visual, auditory, tactile, and kinesthetic to address the unique challenges dyslexic students face in decoding and reading fluently (O'Brien et al., 2022).

The Information Processing Theory (Gagne, 1975) supports this by explaining that multisensory input strengthens the encoding, storage, and retrieval of information, which is

essential for students who struggle with memory recall (Guo, 2018). Vygotsky's socio-cultural theory emphasizes the importance of social interaction and scaffolding, where students receive support from teachers or peers to master reading skills they cannot yet do independently (Abdullah et al., 2019). Skinner's operant conditioning theory (Skinner, 1953) suggests that positive reinforcement such as praise or rewards helps motivate dyslexic students to engage with reading tasks and build confidence, fostering a positive learning environment. Together, these theories provide a strong foundation for helping dyslexic students improve their reading abilities through tailored, multisensory learning experiences.

The research also deepens understanding of how cognitive theories like Information Processing Theory (Gagne, 1975) and Vygotsky's socio-cultural theory (Abdullah et al., 2019) align with multisensory learning. It provides new insights into how these theories can be applied to scaffold learning for dyslexic students, offering a framework for targeted support that enhances memory, recall, and understanding. Moreover, it highlights the role of reinforcement strategies from Skinner's operant conditioning theory (Skinner, 1953) in fostering motivation and improving engagement, key components that ensure sustained progress in literacy.

By linking theory and practice, the research offers educators practical, evidence-based strategies for improving reading outcomes for dyslexic students. It further supports the growing consensus that individualized, multisensory teaching methods are critical for students with learning differences, providing a more holistic and effective approach to literacy education than traditional methods. This broadens the scope of existing knowledge by showing how combining theoretical insights with multisensory techniques can lead to more inclusive, effective teaching practices in diverse learning environments.

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