

Use of Phono-Graphix™ Method to Improve the Phonological Awareness Skills of a Student with Reading Difficulty

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Abstract Reading is a reliable predictor for students to succeed and become productive members of society and phonological awareness (PA) has been identified as a strong indicator of becoming a skilled reader. It has to be understood that reading is not a natural skill and may not develop without intervention. Students experiencing reading difficulty should be provided intervention that recognizes PA as the basic skill to be gained. The purpose of this study is to investigate the effectiveness of Phono-Graphix™ method with a 6-year-old student diagnosed with attention deficit hyperactivity disorder (ADHD) and reading difficulties. This study used a single-subject design with a pre-test and post-test comparison and no control group. The principle of this design is that any changes upon the outset of intervention can be attributed as the direct result of intervention. Using four Phonological Processing Tests [21], the phonological awareness skills of the student were assessed prior and immediately after the intervention. Explicit instruction was delivered one-to-one for 40-minute sessions given three times a week for a 20-week period [26]. Findings suggest that the use of Phono-Graphix™ method improved the phonological awareness of the student in blending, segmenting, phoneme manipulation, and code knowledge. Findings of this study can add Phono-Graphix™ to the repertoire of strategies of special education practitioners, particularly when teaching students exhibiting the same characteristics as the participant herein. Results and implications for

special education, teaching of reading and future researches are discussed.

Keywords Phono-Graphix™, Reading Difficulty, Phonological Awareness

1. Introduction/Background

Learning to read is the most important skill that a child can acquire during his/her school years. It is a fundamental and necessary skill and gateway to success in today's literacy-driven society [8,9,19]. "Children must learn to read so that later they can read to learn" (p. 396) [9]. Researchers are in accord in asserting that reading is the foundation of a child's life-long education [43] and it is the means to learn other school subjects [24]. Although these statements are valid and correct, they are too general, too lofty and do not actually depict the real pictures associated with the ability or inability to read. What learning to read will do is to allow the child to acquire the information that others have written down, to share his/her own experiences and opinions, and to put his/her questions and ideas on paper [21]. Reading will offer the child hours of enjoyment and, as reported in the recent research, decrease the likelihood of anti-social behavior, unskilled employment and unemployment [29]. Children's ability to read

enhances their self-development with regard to improving rational judgement and flexibility, competence to focus the imagination and aptitude to achieve intellectual fulfillment, and gain useful skills for everyday life [38].

In contrast, children who experience reading difficulties are more likely to have lower academic achievement [8]. Those who cannot read are less likely to graduate from high school and more likely to be jobless; hence, they would need to be supported by their government [19]. Smart et al. [29] in their study compiled the findings of prior researches indicating that reading difficulty is a common childhood problem that has consequences for later performance and development. These consequences may appear in all stages of life from just poor school functioning to juvenile delinquency and up to adult psycho-social difficulties.

Admittedly, reading is a prerequisite skill to advance in all academic areas. Since reading skills contribute immensely to the academic and social success of a child, reading difficulty in early school years has become one of the major concerns of the academic community as evidenced by a large body of research focusing on reading intervention.

Findings in longitudinal studies show that students who exhibited reading difficulties in their first grade will continue to experience reading problems and failures up to the end of fourth grade [59]. Torgesen [32] reported that students who fail to acquire vital reading skills during their first three years in elementary school are unlikely to match up to their same age peer. Evidently, reading is a reliable predictor for students to succeed in school and become productive members of society [8]. To help these students with reading difficulties, their teacher needs to design a reading intervention. It has to be understood that reading is not a natural skill; in fact, "there is nothing natural about learning to read. The written code is an invention and the process is in no way native to children" (p. 25) [21]. Furthermore, the ability to connect sounds and symbols may not develop without intervention [9]. Almost 75% of students with reading difficulty will continue to struggle all through high school and adult life if intervention is delayed up to nine years of age [9]. The gap between 4th graders with reading difficulty and regularly developing students may further widen in the absence of early and appropriate reading intervention [8].

1.1. Quest for Appropriate Intervention

To determine appropriate intervention, one needs to initially identify the source of difficulties being experienced by students. Difficulties in reading are characterized by impairments in cognitive processes including phonological processing, verbal processing speed and short-term working memory [13,27,31]. In addition, difficulties in reading are caused by failure to master pre-reading skills which are phonological awareness, visual attention and word meaning [5]. It is

worthy to note that most problems in reading have nothing to do with level of intelligence; in fact, reading difficulty can develop even in students with complete or superior intelligence [27]. The present hypothesis is that reading difficulty is associated with processing ability. Students with reading difficulty should therefore be provided interventions that will give them opportunity to practice the ability to do phonological processing that is to process sounds and their relation to letters and letters into words and associating written symbols into spoken language [37].

Teachers and interventionists can help students with reading difficulty by improving first their phonological processing. Recent study describes phonological processing as a hearing mechanism that displays how phonological aspects of the auditory signals work [35]. Phonological processing is a set of mind abilities that deal with different linguistic operations that use information about sound structure of language [8]. Earlier studies plainly explain phonological processing as the method in which one uses the sounds of his/her language to communicate through spoken and written words [37]. Researchers consistently point out that the improvement of phonological processing skills is indispensable for reading advancement, regardless of phonological structure, orthography and writing system [35].

Phonological awareness (PA) is a vital skill for students to obtain during preschool [23]. Research literature is consistent in describing PA as the ability to identify and manipulate the sound structure of spoken language. PA is considered the key skill in learning to read in alphabetic system [17] which includes knowledge and competence in carrying out phoneme-grapheme correspondence rules [31]. PA allows the learners to further the stability of phoneme-grapheme correspondence and discover that sounds (phonemes) and graphemes (picture representation of sounds) are related. Good PA facilitates the favorable achievement of reading skills because it allows the students to discern, manipulate and distinguish the sounds of a language.

Furthermore, PA involves the understanding of two things [8]. First, students must understand that words can be segmented into their basic sounds smaller than a syllable. Second, students must learn individual phonemes themselves. In addition, students should learn that letters are representation of sounds (spoken words) not the other way around [21].

Phonological skills have traditionally been grouped into three main concepts, namely phonological awareness, phonological working memory and rapid automatic naming [34]. Of the three concepts, PA has been identified by several studies [8,28,34] as a strong indicator of becoming a skilled reader.

It is imperative for students with reading difficulties to be trained in making the connection between verbal and written language; however, PA training or intervention is not enough on its own [25]. PA along with blending and segmenting phonemes is shown to be effective in

advancing phonemic skills recognition [9]. Blending is done when distinctive sounds are put together while segmenting phonemes is done when sounds are distinguished separately. These core skills are regarded as the probable cause for many cases of reading difficulties [9]. Braun, Austin and Ledbetter-Cho [2] said that these core deficits manifested by students with reading difficulty when addressed are responsive to explicit instruction.

Explicit instruction is a teaching design that promotes detailed and intensively prepared lesson [1] where the teacher directly models the required skill, provides minimum to maximum assistance to practice, gives feedback and then creates opportunity for application without supervision [14]. Its principle is that teaching must be precise and free from ambiguities and misconceptions to hasten student's learning [2].

Explicit instruction, according to research, is beneficial and must be provided to students at-risk and experiencing reading difficulty [2,19]. This finding is consistent in the reports presented in Endress et al. [9], stating that explicit instructional strategies yield better results when used during reading instruction on PA and phonic strategies. Since students with reading difficulty gain the required reading skill slower than other students, it is crucial that interventionists must do more in less time. This concept is feasible by utilizing explicit instruction [9,33]. Meanwhile, explicit phonics instruction is the most auspicious intervention for students with reading difficulty [31]. When presented explicitly, the cited instructions draw better academic results for students with reading difficulty [30]. Hence, it can be surmised that explicit instruction is the most efficient way for students to obtain reading skills [9].

One reading program intervention that recognizes PA as the basic skill to be gained by students with reading difficulty and uses explicit instruction is Phono-Graphix™ method [21]. The method was developed as an alternative strategy to synthetic and analytic phonics approaches which are popularly used in teaching grapheme-phoneme correspondence.

Synthetic phonics approaches promote prompt but grouped instruction in which students are taught to pronounce sounds singly and then put them together to make a word [10]. This approach teaches letter names and letter sounds. While there are justifications to be found in research literature for this approach, there are also a number of studies repudiating this approach, finding that teaching letter names and sounds together can result in children confusing the two [36]. Phono-Graphix™ method teaches only sounds. The developers of the method are of the opinion that learning letter names to letter sounds causes confusion making it difficult for children to differentiate the two. This orientation from letters to sounds from which all phonics instructions begin is wrong [21].

Moreover, Phono-Graphix™ is based on the premise that English language is a sound-based code in which

letters do not make sounds; they are pictures of sounds instead. To address the weakness of synthetic approaches, research literature has been relentless in searching for approaches that could really work until analytic phonics or the whole language approach came to be. Analytic phonics approaches start with the whole words and then break them down into constituent parts such as onset and rime. In the word *read*, 'r' is the initial sound called onset and 'ead' is the final sound termed as rime [3,12]. However, onset/rime drills are forcing a child to remember part of the word as if it is a unit, when in reality it is a number of individual sounds [21]. The drills are problematic because vowels and consonants can be put together in 15 different patterns, a blend of these letter families will draw out over 1000 possible rimes [36]. The opinion of the pioneers of whole language that children can memorize infinite number of whole words was contradicted by findings from a line of research presented in a study [19], showing that a human mind can recall not exceeding 2,000 unique signs. Phono-Graphix™ views itself as dissenting from both synthetic and analytic phonics approaches because it does not teach phonics rules and letter names neither does it force the students to memorize impossible number of signs and words. The only method that will work in correcting reading failures is decoding one sound at a time [21].

Phono-Graphix™ method depends on the students' potential to discriminate sounds and their capability to decode and blend phonemes. It is designed to start with what the student already possesses, the sounds of his/her language. The advantage of this design lies in the main hypothesis of starting with the students in smart role. This hypothesis is supported by results from a review of reading methods which revealed that working phonological skills alongside self-esteem lead to favorable reading method [7].

1.2. Phono-Graphix™ Method and Reading Difficulties

Using quasi-experimental design with pretest/posttest comparison, the proponents of Phono-Graphix™ implemented the program to 87 children with reading difficulty aged 6 to 16 years old. The reading skills of the participants were measured before the intervention. The participants received one-to-one instruction for one hour given once a week which lasted for 12 weeks. The results of the study indicated that the new method was an effective reading intervention for those with reading difficulty [20].

In another study [25], two participants with hearing impairment were both in grade 4 during the time of the study. Prior to the 12-week intervention period, the children were pre-tested measuring spoken and written language, phonological skills and knowledge of the alphabet. Participants showed increase in all measures after the intervention. The study further reported unexpected positive effects of the program to the behavior of both children. Their attention span improved and they displayed increased attentiveness during oral lessons. Because of

these results, the researcher concluded that Phono-Graphix™ works not only to normally hearing children but as well as to children with hearing impairment. Future researchers were even encouraged to start using Phono-Graphix™ at the earliest stage of education positing that more gains could have been received by the participants if intervention started before their 4th grade.

Phono-Graphix™ was also employed to address the reading skill deficits across a wide range of age groups. Using a pre-experimental design, the researchers examined the effects of the program particularly using an intensive tertiary-level reading intervention for 16 students aged 6 to 17 years. Students' reading skills were pre- and post-tested using the Woodcock-Johnson Psycho-Educational Battery-3rd Edition: Test Achievement (WJ-III ACH). Explicit instruction was delivered two hours daily on a one-to-one basis or in a small group of two to three students for an eight-week period. Results of the study support the assertion of previous study that skill deficit in sound-letter correspondence may be the cause of the reading difficulties [9].

The above results supported the findings in Vaughn and Linan-Thompson[33] which noted that children with reading skills deficit are responsive to explicit instruction. The improvement of the participants was similar to those achieved by previous study [20]. However, the cited studies have weaknesses such as lack of control group, the limited number of participants which restricted the ability to generalize the results and lack of instructional fidelity [20,33].

Despite these weaknesses, the researchers concluded that explicit instruction addressing phonemic awareness presents much encouraging results in improving the reading deficits of students with reading difficulties.

The issue of control group in using Phono-Graphix™ was addressed earlier by the study undertaken by Dias and Juniper[7]. The study was performed with a group of Bristol schools using a mixture of teaching methods that included Phono-Graphix™. A total of 60 participants were taken as sample. Phono-Graphix™ was delivered to the experimental group composed of 29 children while lessons using strategies implemented by their classroom teachers were received by the control group with 31 members. Both groups had children identified as having poor basic literacy skills. Seven months later, the progress of the children was evaluated and analyzed. Findings revealed that children in the experimental group acquired not only better skills in segmenting and blending but also displayed ability to generalize and practice these skills even in different circumstances. The researchers attributed the gained ability of the children in the experimental group to analyze and synthesize phonemes to the use of Phono-Graphix™ method.

Another study examined the efficacy of Phono-Graphix™ method to 10 students with specific learning disability, specifically dyslexia, aged nine to 11 years old [36]. Instruction was delivered on a one-to-one

set up given twice a week for 30 minutes per meeting. The final analysis of the students' phonological processing skills and reading ability was carried out after the intervention which lasted for eight months. The findings of this study indicated that Phono Graphix™ improved the phonological processing skills of the students. Despite the improvement, the researchers had concerns like the sustainability of the improvement of the students. They, therefore, encouraged future researchers to design a longitudinal study that may follow the progress of the students after several years.

In Shaw and Davidson [26], there were four primary students identified as struggling or non-readers. Using four Phono Graphix™ diagnostic assessments, the researchers measured the literacy skills of the students before and after the intervention. Instruction was given twice and sometimes thrice a week during pull-out time from class for 40 minutes each for 20 weeks. Results revealed development on all literacy sub-skills of the students. However, the researchers doubted if the improvement could exclusively be attributed to the program since the students continued receiving Jolly Phonics lessons during their regular classes. Assuming that Phono-Graphix™ supplemented the lessons, the question on how much of the improvement could be credited to Phono-Graphix™ still remains. Results of this research are encouraging but the authors acknowledged the need for further evaluation of the program specifically on initial reading instruction.

All studies that were included in the review aimed to improve the phonological awareness of the students through Phono-Graphix™ using pretest-intervention-posttest or A-B-A sequence. In addition, the participants of the reviewed studies were characterized to be experiencing reading difficulty and some were with special educational needs like hearing impairment [25] and specific learning disability [36]; however, none of them is with Attention Deficit Hyperactivity Disorder (ADHD). The participant of the present study has also reading difficulty but with different special educational needs which is ADHD.

ADHD has detrimental effect on the academic achievement of students and reading difficulty appears to be more prevalent among students with ADHD [16]. Characterized by inattention, learners with ADHD may struggle with decoding [38]. Although the connection between ADHD and reading difficulty has already been noted, only a few studies focus on addressing reading ability and ADHD [16]. Hence, this study specifically addresses the reading difficulty of a student with ADHD.

2. Materials and Methods

This research used a single-subject design with a pre-test and posttest comparison and no control group. The intent of the design was to compare the test results of the student prior and after the intervention [15]. The underlying

premise of this design is that any changes upon the outset of intervention can be attributed as the direct result of the intervention [11]. Thus, in this design, the student served as his own control factor. The design is ideal for a researcher to probe the effects of interventions employed to individual students and to examine the effectiveness interventions with limited number of participants to form an intervention and a control group [18]. The above is generally the case when investigating the efficacy of instructional interventions for students with special needs. When using this design, researchers must ensure that the learning and behavioral characteristics of students in the model study are similar with those of their participants because the more similar they are, the more they will achieve the same results [6]. The participant of the present research and that of McGuinness, McGuinness and McGuinness [19] and Shaw and Davidson [26] have the same learning concern which is reading difficulty.

To address the concern of Shaw and Davidson [26] that doubted if the improvement could be exclusively attributed to Phono-Graphix™ since the method was given along with other reading programs, the present researchers requested that all existing reading lessons, either structured or unstructured, being attended by the participant be discontinued. The student's academic tutor was instructed to refrain from giving reading tutorials. The student continued attending occupational therapy sessions in which the activities focused on behavior management and improvement of skills necessary for daily living and working activity and none of which was geared to address reading ability.

2.1. Participant

Purposive sampling was used as an appropriate strategy in selecting the participant of this study. The participant is a six-year-old male student and is addressed herein as Yuel (not his real name). Prior to the intervention, he was convinced that he could never learn to read.

After an extensive assessment conducted by his developmental and behavioral pediatrician, Yuel was diagnosed with attention deficit hyperactivity disorder (ADHD). The results of the Kaufmann Brief Intelligence Test-2 (KBIT-2) performed by the physician showed that Yuel is of average intelligence. Wide Range Achievement Test 4th Edition (WRAT-4) was also performed to assess his academic skills. The results of WRAT-4 suggested that Yuel was underachieving in reading; hence, learning disability (reading) was considered a comorbid condition. One of the recommendations of the said physician was for Yuel to undergo reading intervention. Such recommendation was consistent with that of his classroom teachers, advising his parent to seek specialized help for intervention since Yuel was not benefiting from the method of instruction being implemented in his classroom which resulted in poor academic performance and low

academic grades. Before Yuel was given the intervention, his mother signed an informed consent.

2.2. Teacher and Materials

The teacher who delivered the explicit instruction used the book Reading Reflex [21] as a guide in providing the lessons. Although the proponents of Phono-Graphix™ invite teachers, reading therapists and parents to connect with them, they do not require a formal training from them to implement the program. The book was offered and purchased online. It contains rationale and instructions in the implementation of the program; it provides all instructional materials needed to support teaching and specifies goals and ways to present every lesson to the student as well as suggestions on how to correct problems that may be exhibited by the student.

2.3. Research Procedure

Phono-Graphix™, as the independent variable, was developed by McGuinness et al. (1996) as an alternative strategy to existing reading approaches. The method utilizes explicit instruction techniques and addresses the core skills needed to improve phonological awareness. The core skills are considered subskills in this test; they are segmenting, blending and phoneme manipulation. Phoneme manipulation is the ability to remove, add or move individuals sounds in a word. Code knowledge test establishes the student's knowledge of the English code. The numbers of items are 15, 42, 10, and 50, respectively. Each item and correct answer is worth one point. Phono-Graphix™ is designed for use with children four years old up to adult non-readers.

The phonological awareness of the student is the dependent variable of this research. During assessment and evaluation, phonological awareness and knowledge of the code were established using four Phonological Processing Tests [21] which are part of the Phono-Graphix™ program. The tests were given on July 9, 2018 and on November 23, 2018.

The process of intervention was as follows: preparation of materials for intervention and the implementation of the intervention as scheduled. The teacher strictly followed the steps and instructions in the book [21] as well as the study of Shaw and Davidson [26] who tested the effectivity of Phono-Graphix™. The student was taught one-to-one from July 9, 2018 to November 23, 2018 for 40 minutes per session; each session was given thrice a week that lasted for 20 weeks based on Shaw and Davidson' study [21]. Instruction was divided into four different levels which are the basic code, adjacent consonants, advanced code and multi-syllable words.

A part of the intervention plan is shown below.

Table 1. Part of the intervention plan with goals and estimated number of sessions per lesson

No. of sessions	Lesson	Goals
1	Blending game	<ul style="list-style-type: none"> -to encourage the student to think about sounds in words -to make the student to put together isolated sounds in words
1	Finding sounds around us	<ul style="list-style-type: none"> -to encourage the student to think about sounds in words -to make the student to isolate the initial sound from the rest of the word
3-4	Three-sound word building Reading stories in basic code	<ul style="list-style-type: none"> -to recognize the sight to sound relationship of text -to recognize the left to right relationship of text -to cause the student to understand how he/she can represent sounds in words -to create reflexive spelling strategy -to practice reading basic code in stories

Posttest was administered after the lesson titled "Finding the Loud Syllable in Multi-syllable Words" which was on the 20th week of the intervention period. To analyze the data, the researchers used frequency. They also referred to the descriptions of scores prescribed by McGuinness and McGuinness[21] as shown in Table 2. The table below shows how scores per test are interpreted.

Table 2. Interpretation of phonological processing tests

Test	Maximum Score	Good	Low Moderate	Poor
Blending	15	+14	-14	-11
Segmenting	42	+40	-40	-36
Phoneme Manipulation	10	+8	+5	-5
Code Knowledge (6 years old)	50= 100%	60-100%	50-60%	-50%

3. Results

The participant's pretest and posttest scores are shown below.

Table 3. Phonological processing tests results

Test	Blending	Segmenting	Phoneme Manipulation	Code Knowledge
Pre-Test July 9, 2018	2	5	1	18= 36%
Posttest Nov.23, 2018	14	40	7	45= 100%

Yuel's pretest scores showed single digits in blending, segmenting, and phoneme manipulation tests equivalent to 13.33%, 11.36%, and 10%, respectively; he scored 18 or 36% in the code knowledge. As seen in Table 2, all scores are considered poor, with his ability to manipulate phonemes as his weakest among the skills and none scoring at least 50%.

His post-intervention scores marked improvement with 93.33% in blending, 90.90% in segmenting, 70% in phoneme manipulation, and 90% in code knowledge. Scores registered upward trend by 80%, 79.54%, 60%, and 54% difference, respectively. While Yuel's blending,

segmenting, and code knowledge went from poor to good. His skill to manipulate phonemes was also up from poor to low moderate.

4. Discussion

During the conduct of the initial tests, when asked to segment the sounds, Yuel kept on saying the letter names instead of the sounds; when he was asked to blend the sounds he heard to form a word, he persisted on giving the initial letter name, not the word. He was confused as to how the words should be read. He also read in reverse (e.g., fat = taf, on= no).

After the 20-week Phono-Graphix™ intervention period, posttest results show compelling, positive effects on the development of phonological awareness through the acquisition of blending, segmenting and phoneme manipulation skills; all of which led to the improvement of the reading ability of the student.

During the posttest, Yuel was able to blend individual sounds into word. He scored 14 out of 15. He missed only the word 'crunch' by saying 'curnch' when asked to put together the sounds 'c', 'r', 'u', 'n' and 'ch'. As to his segmenting skills, he was able to isolate the sounds of 11 out of 12 words presented. The item 'trip' was the only word he was unable to segment correctly. He said 'tirp' instead of 'trip,' reversing 'r' and 'i'. Hence, Yuel still committed minimal reversal errors.

In terms of manipulating phonemes, he got seven correct answers out of 10 items. For code knowledge, he was able to identify correctly 45 out of 50 sound pictures. He was not able to identify sound pictures <ou>, <igh>, <aw>, <au> and <ui>. Most of these sounds, except <igh>, are diphthongs.

The results of this research agree with those of McGuinness et al. [20] and Shaw and Davidson[26] from which the researchers patterned the method of instruction and the frequency, consistency and duration of the intervention. This research further lends some support to the idea that phonological awareness along with blending, segmenting and phoneme manipulation skills when addressed using explicit instruction does produce favorable results [30] and leads to better phonemic skills and reading ability [9].

Furthermore, the findings substantiate recent report that explicit phonics instruction is the most promising intervention for students experiencing reading difficulty [31].

The results also affirm the findings of previous researches [7,26], underscoring that structured teaching of the skills necessary to achieve reading ability is less confusing to students as compared to observing numerous rules and encouraging word memorization. Perhaps if Phono Graphix™ method was used at the first symptom of his reading difficulty, it might have been more beneficial, giving him better self-confidence.

Third-Party Assessment

The table below shows the results of WRAT-4 administered prior and two weeks before the conclusion of the intervention.

Table 4. Results of WRAT-4 administer by the student's developmental and behavioral pediatrician

WRAT-4	May 9, 2018	Nov. 5, 2018
Reading	Kinder 0.2	Grade 2
Reading Comprehension	Kinder 0.7	Grade 1.2
Spelling	Kinder 0.1	Grade 1.2
Mathematics	Kinder 0.1	Grade 1.5

The developmental and behavioral pediatrician re-assessed Yuel two weeks before the conclusion of the Phono-Graphix™ program. The results of WRAT-4 revealed that learning (reading) disability was no longer considered as possible comorbid condition. From his previous diagnosis as learner in the kindergarten level, his level rose up to grade 2 in reading, a grade level higher than his actual grade level.

5. Conclusions and Recommendations

This study indicated the effectiveness of the Phono-Graphix™ method because the final scores of Yuel in all the subskills tested improved. After the intervention, the working impression was only ADHD compared to ADHD and reading difficulty five months before. The change of diagnosis was due to the improved results of WRAT-4 which showed that Yuel did not only improve his reading ability but he also advanced his reading level to one grade level higher. It may be implied that the method works especially when combined with one-to-one, explicit instruction.

The improvement shown by the participant was due to the intervention using Phono-Graphix™ method since no other reading instruction was provided during the course of the research program. However, the researchers believe that there is more to be done in examining this method. They noted that instruction is usually delivered explicitly

and one-to-one. If the program is implemented in mainstreamed classes, there would be a considerable cost needed to hire and train teachers to deliver this program to individual students with reading difficulties.

The researchers also acknowledge the limitations in this study such as failure to do a delayed posttest to measure if student's progress would be sustained; hence, they recommend further research to examine the long-term effects of the method. Future researchers are also encouraged to use an A-B-A design focusing on delayed measurement of the phonological awareness skills of their participants to see to what extent the Phono-Graphix™ program is effective. Another option is A-B-A-A design in which a second posttest is administered sometime later without intervening Phono-Graphix™ instruction. Second, this study has only single participant which is usually the case when testing the efficacy of an instruction for students with disabilities. To increase the number of participants, future studies may include typically developing students exhibiting reading problems to test also how the method would work for them.

Finally, the researchers recommend the use of Phono-Graphix™ to parents since the program is designed not only for teachers and therapists but also for them to teach their children as young as four years old on how to read.

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