

The Impact of Using VAKT Strategy on Oral Reading and Reading Comprehension Skills of Elementary Students with Dyslexia

Ayed H. Ziadat

Department of Special Education, Princess Rahman College,
Al-Balqa Applied University, Al-Salt, Jordan
<http://orcid.org/0000-0002-7920-2419>

Abstract. Dyslexia is a learning disability associated with a deficiency of spell, read, write, and recognize words. The key purpose of the study was to examine the desirable enhancing of oral reading and reading comprehension levels by testing the advantage of Visual, Auditory, Kinesthetic, and Tactile (VAKT) strategy on oral reading and reading comprehension among students with dyslexia registering at the governate source classroom. The study adopted a Quasi-experimental approach with the design of control and experimental groups and two measurement phases (pre and post-tests). The study assessed oral reading and reading comprehension levels by the diagnostic scale of Arabic language Basic skills. Thirty-nine subjects were drawn using the purposive sampling technique (control N=19 and experimental N=20), and the intervention VAKT technique was used for third-grade students with dyslexia for one semester consecutively followed by the post-assessment. The results revealed that the control group showed enhancement in comprehension reading and oral reading level, but less significant than the experimental group. Thus, VAKT is a sufficient approach to advance the comprehension reading and oral reading levels of students with dyslexia. The study findings contribute to motivating VAKT strategy using for students representing dyslexia for the sake of reading learning. Further, the study contributes to implementing VAKT in Arabic language learning settings. The researcher recommends considering learning style, motivation, and settings in future studies.

Keywords: Dyslexia; oral reading; reading comprehension; source classrooms; VAKT

1. Introduction

In the last 50 years, various research and literature accurately identified and categorized learning disabilities based on a plausible broad of cognitive, neurobiological, and environmental aetiologies of these deficient. The most authorized results of global efforts are shown in the Diagnostic and Statistical

Manual of Mental Disorders (DSM) editions (American Psychological Association [APA], 2020), and the International Statistical Classification of Diseases and Related Health Problems (ICD) revisions (World Health Organization [WHO], 2019). Through these manual learning disabilities are recognized as a heterogeneous group of learning competencies and need to receive special supports and treatments (Grigorenko et al., 2020). Across countries, the definition and classification of learning disabilities have slight differences. In contrast, some countries have not yet formally defined and recognized learning disabilities like African countries and Indian governments (Hayes et al., 2018). In Jordan, there is no specific category or definition for learning disabled in the Law on the Rights of Persons with Disabilities No. 20 (2017). The only legislated definition is for a person with disabilities, which defined as (Law No. 20, 2017):

“Person who has long-term¹ physical, sensory, intellectual, mental, psychological, or neurological impairment, which, as a result of interaction with other physical and behavioral barriers, may hinder performance by such person of one of the major life activities² or hinder the exercise by such person of any right or basic freedom independently.”

From the definition, learning is considered one of the "major life activities". Thus, any genre of impairments hindering a person from learning is covered by this act, such as learning disabilities. Accordingly, learning disabilities are generally included in the definitions without classification. Locally, students are diagnosed academically with learning disabilities if they do not exhibit the corresponding approved age -or -grade-level standards in, at least, one of the following skills: oral reading, oral expression, reading comprehension, listening comprehension, reading fluency, essential reading skills, written expression, mathematics and calculation, problem-solving in math. In Jordan, the population census reported that around 11% of the population diagnoses with functional deficiency, 22.3% of them have never enrolled in any educational institutions (DOS, 2015). In 2018, the disability prevalence raised to 13% of the population. Unfortunately, the national rate approximates 15% of the global disability prevalence rate estimated by the World Health Organization. Moreover, 35.5% of the disabled population is illiterate. Only 21859 (1.6%) of disabled students receive special education services in the academic year of 2018/2019 (Thompson, 2018). Although that there is no accurate static about the distribution percentage of disabled students according to the disability category needed to integrate the national figure of disability (Al-Zboon & Hatmal, 2015), the Jordanian ministry of education and the Higher Council for the Rights of Persons with Disabilities (HCD) has worked and keened with a solid basis for effective and reliable mechanisms and strategies to increase the enrolling percentage of students with disabilities in public schools from 5% in 2017 to 10% in 2022 (HCD, 2018). However, there is constant screening, assessment, identification, and treatment of learning disabilities at all levels of interest, including global and local levels. The study contributes to examine the

¹ not expected to disappear in at least (24) months

² Major life activities mentioned in Clause (a) of this Article include the following: Eating, drinking, administering, self-care, reading, and writing. Movement and mobility. Interaction and concentration, expression, and verbal, visual and written communication. Learning, rehabilitation, and training. Work.

VAKT strategy's effectiveness as a teaching strategy for this population, which aligns with global and domestic efforts.

Moreover, the current study concerns dyslexia and examines the effectiveness of a teaching strategy based on multisensory discipline within the context of developing oral reading and reading comprehension abilities.

2. Review of Literature

Dyslexia is a term derived from Greek words "dys" and "lexis" which meaning poor or inadequate, words or language, respectively. Accordingly, this term is inferred difficulties or problems in expression, reception, oral, or written functions (Jeyasekaran, 2015). These difficulties translated in reading, spelling, speaking, listening, and writing skills obviously. The International Dyslexia Association defines dyslexia as a neurobiological learning disability that induces a deficiency in the fluency and accuracy level of word recognition, pronunciation, spelling, and decoding competencies (Subramaniam & Nasir, 2020). Even the accurate definition of dyslexia, but professional particularly, teachers still misunderstand dyslexia. For instance, if teachers are asked to define dyslexia, they more likely to answer, "Dyslexia is an impairment that students see words backward." The truth is that students with dyslexia see words normally as their normally developing peers, but their brains process the information differently and make the response as they see the term backward (Norton, Beach & Gabrieli, 2015). Abuzaid and Kayed (2020) defined dyslexia as a condition hinders students from reading at the level of their normally developing peers at the same age, learning language and words within normal teaching techniques, and reading sentences correctly. Thus, dyslexia is known as a reading disorder. It is worth mentioning that people who lose their reading competencies after previously acquiring known as alexia. Dyslexia including various types of reading faults such as dropping, moving, insertion, replacement, reversal, considering, and estimation (Peter, Albert & Gray, 2020). However, treatment of dyslexia mainly depends on adjusting teaching methods or implementing special teaching methods to encounter students' special needs and conditions (AL-Qatawneh, 2020). The teachers' job is to tailor proper pedagogical practices with students to advance their awkward abilities in reading, speaking, spelling, and writing. Rather than changes their abilities or functioning because students with dyslexia are not disabled, but they have a different way of functioning and processing information (Hanif et al., 2019; Mills, 2018).

VAKT strategy

It is academically approved that individuals learn better using more than one sense, especially for improving language learning (Korkmaz & Karatepe, 2018; Mathias et al., 2019; Rao, 2018). The predictive coding theory established that the brain smoothly encodes and recognizes multi-sensory information. Multi-sensory is a teaching approach in which students activate all human faculties, namely, hearing, smelling, touching, seeing, feeling, and tasting in learning settings (Suryaratri, Prayitno & Wuryani 2019). These strategies are known to be natural because it simulates the innate learning process of infant and toddler. The infant in the early stages uses his taste and toddler depends on the tactile sense (touch

or grab) to recognize the surroundings (Sarudin, Hashim & Yunus, 2019). Thus, teachers do not need to exert an extra-ordinary effort to implement multi-sensory strategies.

VAKT has been developed by Fernald and Orton-Gillingham, which is a multi-sensory teaching method that activates visual, auditory, kinesthetic, and tactile sensing in order to encourage learning and retrieving (Jeyasekaran, 2015). Fernald's method activates four main sensory inputs, namely, visual, auditory, kinesthetic, and tactile, and known by VAKT (Chither, 2020). Meanwhile, the Orton-Gillingham method activates only three sensory inputs, namely, visual, auditory, and kinesthetic, which is known as (VAK) (VAK) (Hardiana & Suyata, 2018). The current study used Fernald's method, which consists of four stages, see figure (1) (Hanif et al., 2019). First, the students selected the words they want to learn, which the teacher wrote on boards by large letters, then students were asked to trace the letters with their fingers and writing them on their wrists. While tracing, he read it aloud. Accordingly, the students see (visual), say (auditory), and trace and write on the wrist (tactile and kinesthetic). In this stage, students activate four senses. This process has to be repetitive until students master and add the word in their minds' word bank. The second stage is the stage of learning upgrade. In which the students no more selected the word to learn, they are asked to see, recognize by themselves the word that teachers wrote on cards or whiteboard, and make stories with these mastered words. The third stage is where students have to recognize, see, and read a word from book text rather than ones written on board. In the last phase, (the fourth), the students must have to go through and becomes able to recognize new words and retrieve the old ones.

Several studies examined the effectiveness of the VAKT strategy on reading skills. Prasetyaningrum and Faradila (2019) found that the VAKT approach can be adopted effectively to improve the reading abilities of mild retardation children compared to the conventional teaching methods. They explained the increment of learning achievements due to practicing the VAKT strategy, which applies and extends their acquired knowledge. Agustia and Arifin (2018) targeted the same population of Prasetyaningrum and Faradila (2019) and assessed that the VAKT strategy developed 26.45% of students' alphabetic learning and 17.60% of their computational learning. Agreed to Sarudin et al. (2019), the VAKT strategy not only enhances students' acquiring and retrieving but also enables students to associate ideas with previously acquired knowledge. Jeyasekaran (2015) added that VAKT strategies enhanced reading levels of children with dyslexia and explained that VAKT strategy uses all learning pathways in the brain that why learning, and memorizing were enhanced by a mean score value of 12%. Similar to Arbi, Rianto and Muradlo (2019), who conducted research of one group pre and post-test design and supported that the VAKT strategy has been influenced the reading ability of children with learning disabilities. Further, Gohar (2019) established that the VAKT strategy, which is used in English as a foreign language (EFL) program, improves phonological awareness and spelling abilities of dyslexia students according to the obtained results of the two groups research design.

All above reported studies used the multisensory strategies without defined which methods were adopted Orton-Gillingham's method or Fernald's method. However, the current study complies with Fernald's method. Furthermore, the previous studies, such as Arbi et al. (2019), Prasetyaningrum and Faradila (2019), Agustia and Arifin (2018), Sarudin et al. (2019), targeted learning disabilities in general without defining specific learning disability. Similar to the current study, Jeyasekaran (2015) only targets students presenting dyslexia. But he detected the effect of the VAKT on reading skills without determined the effectiveness of the strategy in each reading skill. No one of the previous studies assesses the VAKT recruiting in Arabic language learning as the present study does.

Previous Arabic studies assessed the VAKT strategy to enhance the attention and perception of students with learning disabilities (see Mahmoud et al., 2020) but no study targets Arabic language teaching for students with dyslexia using the VAKT strategy according to the best knowledge of the author. Also, there is a lack of studies conducting each component of reading skills distinctly.

Accordingly, the study contributes to examine the VAKT strategy's effectiveness for students representing dyslexia. Further, the study contributes to the implementation of VAKT in Arabic language learning settings.

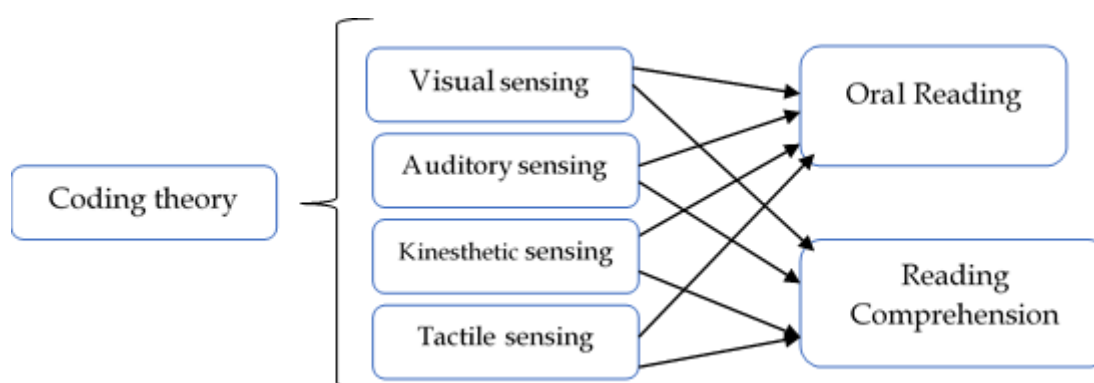


Figure 1: Theoretical Framework using visual auditory kinesthetic tactile (VAKT) strategy on oral reading and reading comprehension skills.

Study Objectives

The study aims to assess the VAKT strategy's effectiveness in developing oral reading and comprehension skills of students with learning disabilities. Hence, the researcher Hypothesizes that:

H1: There is a significant mean score difference in the oral reading level of students with learning disabilities among control and experimental groups.

H2: There is a significant mean score difference in the reading comprehension level of students with learning disabilities among control and experimental groups.

H3: There is a significant mean score difference in the oral reading level of students with learning disabilities between pre and post-test measurement for the experimental group.

H4: There is a significant mean score difference in the reading comprehension level of students with learning disabilities between pre and post-test measurement of the experimental group.

3. Method

The study has adhered to a quasi-experimental two groups' pre and post-test design and quantitative approach (Gopalan et al., 2020) in the sake to answer the study question, namely: "Does using VAKT Strategy impact the oral reading and reading comprehension skills of elementary students presenting dyslexia?"

Study Sample

The study recruited 39 students with learning disabilities in third grades who enrolling Amman elementary schools using purposive sampling technique. The parents of all students were assigned a consent form of participation. All selected students were diagnosed with reading and reading comprehension dysfunctions (dyslexia). Also, they were with visual learning style. The students have distributed equivalently over two groups: the experimental group (20 students) and the control group (19 students). The samples were limited due to global infection of Covid-19 that hinders parents from engaging their children in the intervention. Experimental group students were taught Arabic corpus using the VAKT strategy (During the entire semester). In contrast, the control group was taught by a conventional scheme used in the source classrooms at this period. The study design composites of three main phases: Baseline, intervention, and follow-up (repeated measures), which will be illustrated next.

Instrument

The study adopts the diagnostic scale of Arabic language basic skills developed by (Al-Waqfi et al., 2008). The Jordanian Ministry of education formally accredits this developed scale for screening Arabic language basic skills of pupils presenting learning difficulties. It is worth mentioning that the scale is an Arabic equivalent standardized version of the Kaufman Test of Educational Achievement-II (KTEA-II, (Kaufman & Kaufman, 2004)). KTEA-II measures phonological awareness, oral fluency, and reading fluency. KTEA-II is a screening instrument of the oral reading level (verbal fluency) and reading comprehension (RC) skills. Likewise, the Arabic-standardized version is designed for elementary and primary school ages (1st to 9th grades). The current study utilizes only the part for second and third elementary ages. However, the scale aims to assess reading skills. But the study targets the oral reading and the reading comprehension age of students only as succeeding.

The comprehension age scale consists of five questions that followed one passage. The examiner asks an examinee to read the paragraph silently and answer the followed multiple-choice questions, which the examiner loudly read it. The student can either answer the question verbally or circle the correct answer on paper. Examiner calculates corresponding comprehension age based on the accuracy score. The accuracy score represents a percentage of correct answers to total questions. For example, the accuracy score of a student answering four

questions out of 5 is 80%. Accordingly, the examiner determines the comprehension age of a student using a scale scoring sheet.

Likewise, the instrument assesses the oral reading age of a student based on his reading accuracy. The student has to read a paragraph consisting of around 50 words. Accuracy score represents the percentage of corrected words corresponding to the number of reading errors (for example, if a student faults twice, the accuracy score will be 96%). Accordingly, the examiner determined the oral reading age of a student with the help of a scoring sheet.

Instrument administration times vary according to the examinee's age, mood, and personality. The average time of students in the second and third grade-ages is 30 to 50 minutes.

Examiner starts using the lowest reading level (first semester of the first grade). For each level, the examiner calculates the accuracy score of students. If the calculated score exceeds or equals the succeeding threshold, the examiner will continue with students to the next level. The process is continuous to the first score below the threshold. Accordingly, the examiner defines the reader's age based on the last level, which the student has scored above the threshold. Succeeded thresholds are 80% on the oral reading scale and 98% on the reading comprehension scale. For instance, if a student achieves succeeded age level score on the scale, he will pass to the next age level. The examiner defines the student's age level based on the last succeeded age-level.

Furthermore, the instrument has two forms; form (A) and form (B) of both reading skill facets, in which form (B) is an alternative equivalent form of (A). In the study, the examiner administrated form (A) to the experimental group and form (B) to the control group.

Al-Waqfi et al. (2008) validated the instrument over a sample of 477 female and male students from different grade ages. The correlation between test and retest scores were significant and coefficients were above 0.7.

Study procedure

The study conducted in the earliest period of emerged Covid-19 era. However, the students with learning disabilities, such as those presenting dyslexia, attending schools for remedial classes. HCD asked the government to permit students with learning difficulties to acquire learning through offline settings.

The researcher designed an individualized program based on the VAKT strategy, G. Fernald's methods. The research implemented the VAKT program during the first semester of the 2020 academic year consisting of 64 sessions, four sessions each week. Because remediating reading skills for students with dyslexia require an intensive one-to-one program over an extended period (Mills, 2018).

However, the session duration is 35-40 minutes. The targeted subject is the Arabic language subject content (Arabic corpus) taught to the third elementary grade

students in the curriculum of Jordanian public schools. The program was conducted in the source classrooms of five public schools.

To validate the program, the researcher reported the VAKT program to an advisory panel that includes 15 academic specialists who have extensive expertise in teaching disabled students and professionals in learning disabilities. All their suggestions and recommendations have been taken into account.

The study recruited five remedial teachers implementing the VAKT program. Required teachers hold at least a high diploma certificate on learning disabilities, and work in the capacity of a source teacher for at least two practical experience years. These qualified remedial teachers were selected purposively and recruited in the two weeks VAKT training program (30hrs). It is worth mentioning remedial teachers were naive to study objectives and hypotheses to sustain the validity and reliability of research results. Furthermore, each remedial teacher has to complete a session checklist after each session.

In the baseline stage, the participants (students) completed oral reading and comprehension reading tests. Both tests were administrated in separate sessions for one week. One teacher collects data and determines the oral reading and reading comprehension ages of all participants. The following chart (see fig.1) represents the oral reading and reading comprehension levels of both the experimental and control groups.

Figure (2) shows that the distribution of students based on their level in both the oral reading and the reading comprehension levels are at a first-grade level, with a minority of students have the third-grade level.

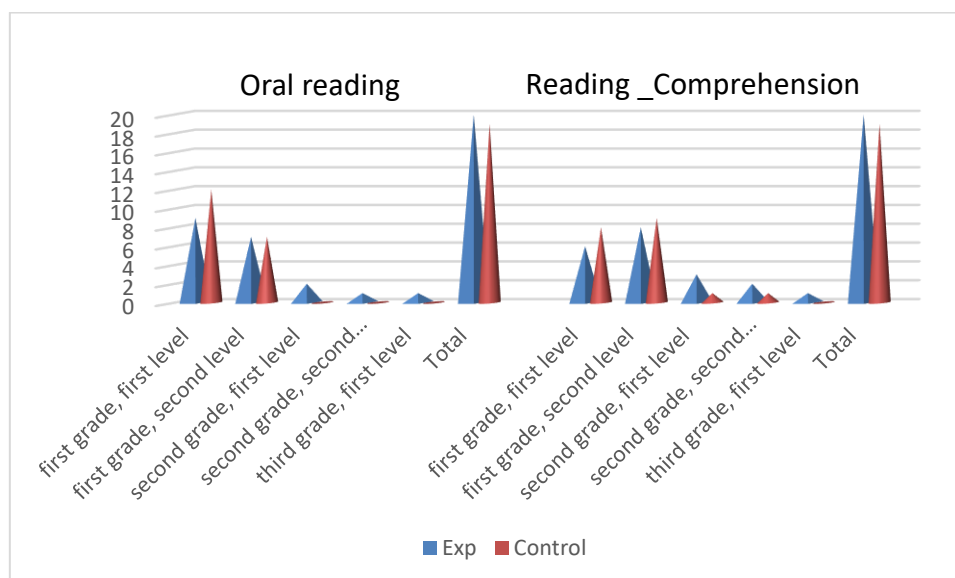


Figure 2: Students' oral reading and reading comprehension levels for both experimental and control group

Accordingly, the intervention phase (treatment) started and last for three months. However, teachers implemented a total of 60 sessions of intervention for each

participant discriminately (5 sessions per week, intensive program). As mentioned previously, the program instructed based on Fernald's method of VAKT strategy, which incorporated specific instructional activities, such as word tracing, skywriting, and writing on the wrist, utilize the word in passages, and visual modulization of term, and instructional materials, such as word cards, highlighted and color pens, crayon, mirror, sand, and whiteboard.

Remedial teachers adhere to invest all modalities of students learning through teaching. For example, teachers introduce the word visually to students, make students tracing the term in their hands or via modeled terms juxtaposes to the oral presentation of terms to the student, skywriting the word, sand writing, mirror using to look to his self when sounded out the phoneme, and simultaneously tapping his fingers to the thumb.

The follow-up phase consists of two sessions in one week for repeated measurement after one week of intervention. Both oral reading and reading comprehension tests were re-administrated for each student individually.

Equivalence Analysis

Before analyzing data the frequencies and percentages were extracted and the chi-square test (Chi2) was used to detect differences between control and experimental groups since the data type is categorical nor continuous (Rutkowski & Svetina, 2017) in order to identify the equivalence of groups to pre-measurement for oral and comprehension Reading as shown in Table (1) below:

Table 1: The percentage and frequency of experimental and control groups in each grade level and Chi-square on oral reading levels of students in the pre-measurement (N = 39)

Group		Pre_Oral_Reading					Total	Chi2	Sig.
		1st grade (S1)	1st grade (S2)	2nd grade (S1)	2nd grade (S2)	3rd grade (S1)			
Experimental	N	9	7	2	1	1	20	4.406	0.354
	P	45.0%	35.0%	10.0%	5.0%	5.0%	100.0%		
Control	N	12	7	0	0	0	19		
	P	63.2%	36.8%	0.0%	0.0%	0.0%	100.0%		
Total	N	21	14	2	1	1	39		
	P	53.8%	35.9%	5.1%	2.6%	2.6%	100.0%		

The results in table 1 supported that the students were equivalent in the pre-measurement of oral reading, (Chi2) = (4.406) and it is not significant, which indicates the possibility of conducting a treatment to identify its effect in raising the level of oral reading among the students.

Table 2 :The percentage and frequency of experimental and control groups in each grade level and Chi-square on reading comprehension levels of students in the pre-measurement (N = 39)

Group		Pre_Comprehension_Reading					Total	Chi ²	Sig.
		1 st grade (S1)	1 st grade (S2)	2 nd grade, (S1)	2 nd grade, (S2)	3 rd grade (S1)			
Experimental	N	6	8	3	2	1	20	2.654 ^a	.617
	P	30.0%	40.0%	15.0%	10.0%	5.0%	100.0%		
Control	N	8	9	1	1	0	19		
	P	42.1%	47.4%	5.3%	5.3%	0.0%	100.0%		
Total	N	14	17	4	3	1	39		
	P	35.9%	43.6%	10.3%	7.7%	2.6%	100.0%		

Also, it was found that there were no statistically significant differences between control and experimental groups on the pre-measurement of reading comprehension skills, as the value of (Chi²) was (2.654) (see table 2) and it is not statistically significant, which indicates the permissibility of applying the treatment.

4. Result

H1: There is a significant mean score difference in the oral reading level of students with learning disabilities among control and experimental groups.

Table 3: The percentage and frequency of experimental and control groups in each grade level and Chi-square on oral reading levels of students in the post-measurement (N = 39)

Group		Post_Oral_Reading					Total	Chi ²	Sig.
		1 st grade (S1)	1 st grade (S2)	2 nd grade, (S1)	2 nd grade, (S2)	3 rd grade (S1)			
Experimental	N	0	1	13	4	2	20	28.367 ^a	0.00*
	P	0.0%	5.0%	65.0%	20.0%	10.0%	100.0%		
Control	N	5	12	2	0	0	19		
	P	26.3%	63.2%	10.5%	0.0%	0.0%	100.0%		
Total	N	5	13	15	4	2	39		
	P	12.8%	33.3%	38.5%	10.3%	5.1%	100.0%		

*: significant at the level of (0.05).

According to the table (3), the result illustrates the effectiveness of the VAKT strategy on oral reading levels. It is noted that results show an increment in oral reading levels of control group students like the experimental group. But the majority of the control group passed the first semester in the first grade, and only two students of the control group reached the first semester of the second grade (see table 1 and 3). However, the majority of experimental group students reached the first-semester level in the second grade. Further, around 30% of the experimental group scored above the first-semester level in the second grade.

Where it was noticed that there was an enhancement of the control group, it was noted that there were statistically significant differences among the experimental group ($\text{Chi}^2 = 28.367$) and it is significant at the level of (0.05). Accordingly, hypothesis H1 is validated.

H2: There is a significant mean score difference in the reading comprehension level of students with learning disabilities among control and experimental groups.

Table 4: The percentage and frequency of experimental and control groups in each grade level and Chi-square on reading comprehension levels of students in the post-measurement (N = 39)

Group		Post_Comprehension_Reading						Total	Chi ²	Sig.
		1 st grade (S1)	1 st grade (S2)	2 nd grade, (S1)	2 nd grade, (S2)	3 rd grade (S1)	3 rd grade, (S2)			
Experimental	N	0	0	3	12	3	2	20	29.136 ^a	0.00*
	P	0.0%	0.0%	15.0%	60.0%	15.0%	10.0%	100.0%		
Control	N	3	11	4	0	1	0	19		
	P	15.8%	57.9%	21.1%	0.0%	5.3%	0.0%	100.0%		
Total	N	3	11	7	12	4	2	39		
	P	7.7%	28.2%	17.9%	30.8%	10.3%	5.1%	100.0%		

It is noted from table (4) that the effectiveness of VAKT strategy on post comprehension reading among the experimental group since it showed an increase in the levels of second grade (the second semester), third grade (the first semester), and the third grade (second semester).

While the control group showed enhancement in comprehension reading, but less significant than the experimental group, as resulted in analyzing the VAKT strategy, $\text{Chi}^2 = (29.136)$ with a significant level less of (0.05). Accordingly, hypothesis H2 is validated.

H3: There is a significant mean score difference in the oral reading level of students with learning disabilities between pre and post-test measurements of the experimental group.

Table 5 :The difference between pre and post measurement in oral reading levels of the experimental group (N = 20)

Measurement		Oral Reading						Total	Chi ²	Sig.
		1 st grade (S1)	1 st grade (S2)	2 nd grade, (S1)	2 nd grade, (S2)	3 rd grade (S1)	3 rd grade, (S2)			
Pre-test	N	9	7	2	1	1	0	20	26.36*	0.00*
Post-test	N	0	1	13	4	0	2	20		
Total	N	9	8	15	5	1	2	40		

As it is noted from table 5 that the VAKT strategy is effective; since the post oral reading among the experimental group mainly distributed on higher grade levels (first and second semesters in second grade) compared to pre-oral reading, which distributed in the lower grade levels (first and second semesters in first-grade). However, the difference between pre and post measurements was significant since Chi² = (26.36) with a significant level less of (0.05). Accordingly, hypothesis H3 is validated. This result supported that enhancement in the oral reading level is imputed to the effective VAKT strategy.

H4: There is a significant mean score difference in the reading comprehension level of students with learning disabilities between pre and post-test measurement of the experimental group.

Table 6: The difference between pre and post measurements in reading comprehension levels of the experimental group (N = 20)

Measurement		Reading Comprehension						Total	Chi ²	Sig.
		1 st grade (S1)	1 st grade (S2)	2 nd grade, (S1)	2 nd grade, (S2)	3 rd grade (S1)	3 rd grade, (S2)			
Pre-test	N	6	8	3	2	1	0	20	24.14*	0.00*
Post-test	N	0	0	3	12	3	2	20		
Total	N	6	8	6	14	4	2	40		

It is clear from the table 6 that the post-reading comprehension levels of the experimental group mainly distributed on higher grade levels (first and second semesters in second grade and first semester in the third grade) compared to pre-reading comprehension levels, which distributed in the lower grade levels (first and second semesters in the first-grade). Hence, the VAKT strategy is effective. However, the difference between pre and post measurements was significant since Chi² = (24.14) with a significant level less of (0.05). Accordingly, hypothesis H4 is validated. This result supported that enhancement in the reading comprehension level is imputed to the effectiveness of VAKT strategy.

5. Discussion

Succinctly, the results addressed that there are differences in students' level in both comprehension and oral reading skills. Students taught by the VAKT strategy acquired higher levels compared to those students taught conventionally in both oral reading and reading comprehension skills (see tables 3, 4). Furthermore, the results emphasized differences in the students' oral reading and reading comprehension levels in the experimental group. Thus, the students presenting dyslexia developed their oral and reading comprehension skills sufficiently through the VAKT strategy adoption. In terms of reading comprehension, results are in accordance with that found by (Arbi et al., 2019; Gohar; 2019; Jeyasekaran; 2015). The statistically significant improvements in comprehension reading of the experimental group referred to the implemented multi-sensory approach (VAKT strategy) since students establish a reciprocal relationship among all sense inputs because the VAKT activates all senses. Through the sessions, the student engages his kinesthetic sense by moving (such as in skywriting), tactile sense (such as in tracing words), visual sense (such as in word cards), and auditory (such as in listing activity). In turn, the student can easily acquire and consistently retain words and meanings.

In the context of oral reading skills, the results are in accordance with that found by (Arbi et al., 2019; Gohar, 2019; Jeyasekaran, 2015). Statistically significant improvements of oral readings in the experimental group referred to the implemented multi-sensory approach (VAKT strategy) since the students establish a reciprocal relationship among all sense inputs because the method activates all senses. Through the sessions, the student engages his kinesthetic sense by moving (such as in tapping and skywriting), tactile sense (such as in tracing words), visual sense (such as in word cards), and auditory (such as in listing activity). In turns, the student can easily acquire and consistently retain words and spellings. Using all sense of kinesthetic approach combined with hearing, seeing, observing make students utilize both sides of the brain to process multi-sensory information rather than one neurological pathway. Likewise, VAKT may provide a fun learning experience (Prasetyaningrum & Faradila, 2019; Sarudin et al., 2019). Thus, the VAKT strategy may motivate students to learn and read (Chither, 2020).

The descriptive statistical results pinpointed that the estimated average level development was between one and a half and two grade-levels in reading comprehension and between one to one and a half grade levels in oral reading. Previous studies explained that increment of the reading comprehension level of experimental group associates with their augmentation level in oral readings skills (Solari et al., 2017; Yildirim & Ates; 2012). This supported that oral reading level is a significant predictor of the reading comprehension, which agreed to the verbal efficiency theory that points out the significance of word-level accuracy to reading comprehension. This can explain the ostensible difference in the level of development between comprehension and oral reading skills.

From another perspective, the increment of oral reading and comprehension can be explained according to results, which Mahmoud et al. (2020) obtained. They

established that the VAKT strategy improved and developed students' perception and attention, which leads to the development of students acquiring and consequently comprehending since attention is a paramount factor in acquiring and learning.

6. Conclusion

Dyslexia is a learning disability associated with a deficiency of spell, read, write, and recognize words. Students presenting dyslexia only need specific and individual teaching approaches aligned with the way information processed in their brain. Literature proposed the VAKT technique to effectively enhance language learning skills, such as reading, speaking, and writing. Thus, the current study examined the effectiveness of the VAKT strategy to improve oral reading and reading comprehension of the Arabic language among students with dyslexia. The intervention is based on specific instructional activities, such as word tracing, skywriting, and writing on the wrist, utilize the word in passages, and visual modulization of term, and instructional materials, such as word cards, highlighted and color pens, crayon, mirror, sand, and whiteboard. The researcher purposively selected 39 students at the third-grade level who are diagnosed with dyslexia divided into two groups (control=19; Exp.=20) with pre and post measurements. In the post-measurement, there is a notable and substantial improvement of oral reading and reading comprehension levels among groups. Furthermore, the experimental group exhibited higher grade levels compared to control and in post measurements than pre-measurement in oral reading and reading comprehension skills. The obtained results support the VAKT strategy effectiveness for improving oral reading and reading comprehension of students with dyslexia. The research data was limited to a categorical data type. Therefore, it is recommended to adopt continuous scale measurements to assess further the effect size of VAKT further statistically on reading skills and making a comparison with normally developing peers of the same age. The researcher recommends considering learning style in future studies as variable. Motivation for reading also can be measured due implication of the VAKT strategy. Moreover, there is a need for further examining the applicability of the VAKT approach in both schools, home, and online settings.

7. References

- Abuzaid, H., & Kayed, M. A. (2020). The impact of using storyboards on Improving reading skills of third-grade students with reading disabilities in Jordanian context. *International Journal of Learning, Teaching and Educational Research*, 19(1), 172-187. <https://doi.org/10.26803/ijlter.19.1.10>
- AL-Qatawneh, Y. H. (2020). Effectiveness of a computerized program in the treatment of Dyslexia in a sample of fourth-grade students. *Asian Social Science*, 16(7), 15-29. <https://doi.org/10.5539/ass.v16n7p15>
- Al-Waqfi, R., Alkilani, A., Jarar, S., & Aldawi, M. (2008). *Basic skills of Arabic language: A diagnostic scale* (4th ed.). The princess Sarvath community college.
- Al-Zboon, E., & Hatmal, M. M. (2015). Attitudes of dentists toward persons with intellectual disabilities in Jordanian hospitals. *Special Care in Dentistry*, 25-31. <https://doi.org/10.1111/scd.12149>
- APA. (2020). *Diagnostic and statistical manual of mental disorders (DSM-5)*. American Psychiatric Association.

- Arbi, R. P., Rianto, E., & Murtadlo, B. (2019). Influence of VAKT method toward reading ability to learning difficulty children in Galuh Handayani elementary school. *3rd International Conference on Special Education (ICSE 2019)*, Vol. 338, (pp. 225-228). Surabaya, Indonesia: Atlantis Press SARL.
- Chither, H. R. (2020). Effect of Vernald way (VAKT) for multiple senses, health care, and clinical learning in dealing with hardship and written to the reading first stage pupils. *Indian Journal of Public Health Research & Development*, 11(2). <http://doi.org/10.37506/v11/i2/2020/ijphrd/195205>
- DOS. (2015). *General population and housing census 2015*. The Department of Statistics.
- Gohar, R. (2019). The effect of multisensory structured EFL program on developing primary pupils' phonological awareness and spelling. *Educational Sciences Journal*, 27(2), 1-35. http://search.shamaa.org/PDF/Articles/EGJes/JesVol27No2P2Y2019/jes_2019-v27-n2-p2_001-036_eng.pdf
- Grigorenko, E. L., Compton, D. L., Fuchs, L. S., Wagner, R. K., Willcutt, E. G., & Fletcher, J. M. (2020). Understanding, educating, and supporting children with specific learning disabilities: 50 Years of science and practice. *American Psychologist*, 75(1), 37-51. <http://dx.doi.org/10.1037/amp0000452>
- Hanif, S., Achmad, L., Madjdi, H., & Utom, S. (2019). The Vakt model-based on psycholinguistic review for overcoming Dyslexia children. *CONNECT 2019: Proceeding of the 2nd International Conference Education Culture and Technology, ICONECT 2019* (pp. 46-56). Kudus, Indonesia: European Alliance for Innovation.
- Hardiana, M. T., & Suyata, P. (2018). The effectiveness of VAK (visual, auditory, kinesthetic) model in learning of summary writing. *International Journal of Research & Review*, 5(8), 43-49. http://www.ijrrjournal.org/IJRR_Vol.5_Issue.8_Aug2018/IJRR008.pdf
- Hayes, A. M., Dombrowski, E., Shefcyk, A., & Bulat, J. (2018). *Learning disabilities screening and evaluation guide for low- and middle-income countries*. RTI Press.
- HCD. (2018). *First annual report on the status of persons with disabilities and their rights in the Hashemite Kingdom of Jordan*. The Higher Council for the Rights of Persons with Disabilities (HCD).
- Jeyasekaran, J. M. (2015). Effectiveness of visual auditory kinesthetic tactile technique on reading level among dyslexic children at Helikx open school and learning center, Salem. *International Journal of Medical Science and Public Health*, 4(3), 315-318. <https://dx.doi.org/10.5455/ijmsph.2015.0511201467>
- Kaufman, A. N., & Kaufman, S. L. (2004). *Kaufman test of educational achievement* (2nd ed.). American Guidance Services.
- Korkmaz, Ş. Ç., & Karatepe, Ç. (2018). The Impact of multi-sensory language teaching on young English learners' achievement in reading skills. *Novitas-ROYAL (Research on Youth and Language)*, 12(2), 80-95. <https://eric.ed.gov/?id=EJ1195281>
- Law No. 20. (2017). *Law on the rights of persons with disabilities No. 20*. Jordanian Government.
- Mathias, B., Klingebiel, A., Hartwigsen, G., Sureth, L., Macedonia, M., Mayer, K., & Kriegstein, K. V. (2019). Sensorimotor cortices casually contribute to auditory foreign language vocabulary translation following multisensory learning. *Brain Stimulation*, 12(2), 401-402. <https://doi.org/10.1016/j.brs.2018.12.295>
- Mills, J. R. (2018). Effective multi-sensory strategies for students with Dyslexia. *Kappa Delta Pi Record*, 54(1), 36-40. <https://doi.org/10.1080/00228958.2018.1407181>
- Norton, E. S., Beach, S. D., & Gabrieli, J. D. (2015). Neurobiology of dyslexia. *Current Opinion in Neurobiology*, 30(1), 73-78. <https://doi.org/10.1016/j.conb.2014.09.007>

- Peter, B., Albert, A., & Gray, S. (2020). Spelling errors reveal underlying sequential and spatial processing deficits in adults with dyslexia. *Clinical Linguistics & Phonetics*, 1-29. doi:<https://doi.org/10.1080/02699206.2020.1780322>
- Prasetyaningrum, S., & Faradila, A. (2019). Application of VAKT methods (visual, auditory, kinesthetic, and tactile) to improve the reading ability for mild mental retardation. *Advances in Social Science, Education, and Humanities Research (ASSEHR)*, 304, 379-385. <https://doi.org/10.2991/acpch-18.2019.91>
- Rao, A. R. (2018). An oscillatory neural network model that demonstrates the benefits of multisensory learning. *Cogn Neurodyn*, 12(5), 481-449. <https://doi.org/10.1007/s11571-018-9489-x>
- Sarudin, N. A., Hashim, H., & Yunus, M. M. (2019). Multi-sensory approach: How it helps in improving word recognition? *Creative Education*, 10(12), 3186-3194. <https://doi.org/10.4236/ce.2019.1012242>
- Solari, E., Grimm, R., McIntyre, N., Lerro, L. S., Zajic, M., & Mundy, P. C. (2017). The relation between text reading fluency and reading comprehension for students with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 41-42(2017), 8-19. <https://doi.org/10.1016/j.rasd.2017.07.002>
- Subramaniam, V., & Nasir, N. S. (2020). Multisensory therapy in letter reversal of Dyslexic pupils. *Universal Journal of Educational Research*, 8(12), 7118-7130. <https://doi.org/10.13189/ujer.2020.081279>
- Suryaratri, R. D., Prayitno, E. H., & Wuryani. (2019). The implementation of multi-sensory learning at elementary schools in Jakarta. *Jurnal Pendidikan Usia Dini*, 13(1), 100-113. <https://doi.org/10.21009/10.21009/JPUD.131.08>
- Thompson, S. (2018). *The current situation of persons with disabilities in Jordan, K4D helpdesk report*. Institute of Development Studies.
- WHO. (2019). *International statistical classification of diseases and related health problems(11th revision)* (Vol. 11th revision). World Health Organization.
- Yildirim, K., & Ates, S. (2012). Silent and oral reading fluency: Which one is the predictor of reading comprehension of Turkish elementary students?. *International Journal on New Trends in Education and Their Implications*, 3(4), 79-91. <http://ijonte.org/FileUpload/ks63207/File/07.yildirim.pdf>