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Effectiveness of a Program Based on A Multi-Sensory Strategy in Developing Visual Perception of Primary School Learners with Learning Disabilities: A Contextual Study of Arabic Learners

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Effectiveness of a Program Based on A Multi-Sensory Strategy in Developing Visual Perception of Primary School Learners with Learning Disabilities: A Contextual Study of Arabic Learners

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Abstract

The current study aims to assess the effectiveness of a program based on a multi-sensory strategy in developing of visual perception for primary school learners with learning disabilities. The study employed the quasi-experimental method on the experimental group of learners. A training program based on multi-sensory strategy was employed on a group of third and fourth graders (n = 30) who were exposed to draw upon their sensorimotor memories and familiarities to recognize the mentally stimulating texts. The other group of 30 learners i.e. the control group was exposed to the regular reading comprehension instructions. Pre-to-post test differences were examined in terms of the learners' visual perception to evaluate the teaching's effectiveness. The results illustrates that there is a difference in the level of visual perception skills of the learners of both groups. And the differences were in favor of multi-sensory strategy. The findings of this study suggest that it is constructive for learners to connect their sensorimotor experiences to the text/or the reading materials they are exposed to.

Keywords: multi-sensory, visual perception, learning disabilities

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Efectividad de un Programa de Estrategia Multisensorial para Desarrollar la Percepción Visual del Alumnado de Primaria con Discapacidades de Aprendizaje: Un Estudio Contextual del Alumnado Árabe

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Resumen

El presente estudio tiene como objetivo evaluar la efectividad de un programa de estrategia multisensorial en el desarrollo de la percepción visual para alumnos con discapacidad. El estudio empleó el método cuasi-experimental en el grupo experimental. Se empleó un programa de capacitación basado en una estrategia multisensorial en un grupo de alumnos de tercer y cuarto grado (n = 30) que fueron expuestos a recurrir a sus recuerdos sensoriales y familiaridades para reconocer los textos que estimulan mentalmente. El grupo control de 30 estudiantes,fue expuesto a las instrucciones regulares de comprensión de lectura. Se examinaron las diferencias entre los exámenes anteriores y posteriores en términos de la percepción visual de los alumnos para evaluar la efectividad de la enseñanza. Los resultados ilustran que existe una diferencia en el nivel de las habilidades de percepción visual de los alumnos de ambos grupos. Y las diferencias fueron a favor de la estrategia multisensorial. Los hallazgos de este estudio sugieren que es constructivo para los estudiantes conectar sus experiencias sensoriomotoras con el texto o los materiales de lectura a los que están expuestos.

Palabras clave: Percepción visual, multisensorial, problemas de aprendizaje.

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Learning difficulty is considered as one of the most important fields of education. Special education focused on other forms of disabilities as well (mental, auditory, visual and motor). This has led to the emergence of specialists in various learning disabilities. The manifestations of learning difficulties have been observed in the academic, emotional and behavioral aspects. Therefore, the parents, teachers and researchers involved in the field of special education have found that the nature of these difficulties were do diverse in their nature which require appropriate strategies and methods of appropriate therapeutic intervention to overcome or mitigate these difficulties (Mohammed, 2013).

There are many terms and definitions in the literature available to describe children or adults with learning difficulties. In the United States there are three very convincing definitions provided for people with learning difficulties by various organizations: Individual with Disabilities Education Act (IDEA, 1997), National Joint Committee on Learning Disabilities (NJCLD, 1997) and Inter-Agency Committee for People with Learning Disabilities. The definition of the Interagency Committee on Learning Disabilities (ICLD, 1987) share most of the factors in the line of other two, including several other common factors like the weakness of the central nervous system, the imbalance in the growth pattern of psychological treatment, the difficulty in achieving educational task goals. There is contradiction between what has been accomplished and against the objectives set forth except mental retardation and emotional disturbances or any disturbances in hearing, sight or environment (Isa, Ishak, Rahman, Saat & Ismail, 2017).

Often learning difficulties appear clearly in the absence of training and practice subjects' curriculum, in which the learners tend to face difficulty in retention and face attention deficit. They tend to find differences in information resources, which result in failure in achieving desired educational goals. Learners who are aided for their learning difficulties are expected to fail, especially when exposed to a difficult task without providing successful educational experiences or therapeutic intervention appropriate to overcome the difficulty (Kandari, 2017; Allan & Ahmed, 2012). Therefore, training the learners with learning difficulties at the beginning of interventions is

important which helps the professionals related to the field of special education, to identify the manifestations of their difficulties. In addition to follow scientific methods and the search for new strategies that contribute to alleviating these difficulties (academic or developmental), interest in improving visual perception is one of the most important areas that have contributed significantly to the mitigation of many other learning difficulties (Abdo, 2016).

The visual perception is not just to see objects clearly when looking into something static, dynamic or even more complex, but it also includes vision. Looking at multiple stimuli which change with time and process helps the learners interpret the meaning and relevance of these stimuli. This process plays the role of a link to the brain which interprets or gives meaning to this information (Kurtz, 2006). So visual perception is the reception of sensory and cognitive functions from visual stimuli and cognitive components of visual knowledge are: visual attention, memory, and distinguish conceptions and visual distinction of perception subject (stability of shape, shape and ground) and place cognition (Garje, Vishnu, Rashmi, Arpita & Maninder, 2015). In addition to this, the visual perception grows by relying on senses where the child sees the objects, distinguishes it and then determines its location in the cognitive operations which is to enter information from the environment through the senses and simple and straightforward definition of perception is seen as methods explain Incoming Information. Thus, the senses are modes of perception and sensations are the raw material that makes them perception (Hamid, 2007).

A lot of strategies and techniques have been found relying on the senses to improve visual perception. Hussein and Bajdaa (2016) confirms that we can teach learners with learning difficulties using the curriculum based on the multiplicity of senses or the so - called VAKT style wherein hearing, seeing, touching and movement applied as strategy to help the learners remember how to write words. This strategy is based on the Vernald method, also known as the visual, auditory, kinesthetic-tactile (VAKT) which refers to learning by using the senses primarily in education and teaching learners with learning difficulties (Karam & Kaoud, 2015).

Many studies have proved the effectiveness of this method (Abdulhadi, 2009). Therefore, when we talk about the visual perception development for learners with learning difficulties, we need to talk about

modern teaching strategies based on the nature of the age. The primary school learners tend to use most of their senses to identify environmental stimuli around them, and try to explain these stimuli (Abu Faadi, 2009).

Special Education in Saudi Arabia: A Brief Overview

During the early 60s, there was no governmental support for the learners with learning disabilities in Saudi Arabia; the learners were entirely dependent on their parents for support (Alajmi, 2006). The services started with braille training for the adult blind people, but young cases/samples were simply ignored and other visual impairment cases were not taken care of (Zayat, 1998; Alwabli, 1996; Afeafe, 2000; Almousa, 1999). From 1960 to 1971, special education in Saudi Arabia expanded from its limited scope to provide special educational needs to both males and females with visual as well as hearing impairment which resulted in substantial increase in the number of special schools. It was in 1971, that the Intellectual Education Institute was set up by the Ministry of Education to address the problems of intellectual disabilities so the curriculum was mainly driven by the aim to develop social, behavioral and daily life skills (Alwabli, 1996). This institute provided residential facilities for the learners enrolled in and focused on improving their communication skills and social behaviour.

Until 1990 there was no provision for resource rooms in public schools, as there was limited exposure to the world of special cases, but there was a significant increase in the number of special schools. In 2000, Inclusive education was promoted and special educational classrooms were provided in the public schools to bring the special cases in the mainstream for their overall development (Ministry of Education of Saudi Arabia, 2002). The Department of Special Education opened special education schools within public schools for learners with mild to moderate intellectual disabilities, mild to moderate autism disorders and hearing impairments (Almousa, 2010; Znkor, 2014). The learners have received special education services through these special classrooms as educational placement. At present, 746 special schools for learners with mild to moderate disabilities including intellectual disabilities and others are running successfully. Various programs have been implemented (316 programs for deaf learners and 171 programs for learners

with visual impairments; Ministry of Education of Saudi Arabia, 2012) as interventions in order to improve the skills of special cases and mostly the learners with severe disabilities have been taken care of all these years. Since other categories of disabilities such as Behavioral and Emotional Disorders (BED) as well as Attention Deficit and Hyperactivity Disorder (ADHD) as these seem to be disorders rather than a type of disability, have not been dealt so well over these years.

Learning difficulties have been acknowledged very late in terms of providing extra care to such cases. Early identification and intervention services have not been mandated well in Saudi Arabia which is supposed to be a desirable step for grouping such learners as per the best suited modality for their effective learning (IDEA Partnership, 2007). Therefore, in the two decades, the field of special education has been diversified in Saudi Arabia. A need to establish professional development programs to prepare teachers and other school staff for inclusive classrooms is highly required and such contextual studies on the data from the learners from Arab region, especially of Saudi Arabia, can definitely prove to be very effective and handy for the professionals. In most cases, using different kinds of professional development methods such as the professional learning community will effectively improve the skills of teachers in their schools. The present study aims to bridge the gap between the professional requirements and the aspiring educators in this area, and provide them with the best suited effective programs which the teacher or educator can improvise depending upon the learners' needs.

Research Problem

Learning difficulty causes a big gap between the academic performance and expected performance of a learner as information retention, integration and retrieval through teaching strategies are educational tools to translate the curriculum into reality; the most important elements of its constituent, as well as they relate closely to the goals and content. Its role is to determine the role of both teacher and learner in the educational process, and to identify the methods and appropriate activities to be used. The need to develop these strategies has emerged by adopting a trend based on the development of teaching strategies and diversity, focusing on the active and

positive role of learners' participation in the educational situation (Allan and Ahmed, 2012). Visual perception problems have received considerable attention as it leads to other developmental problems (ADHD, Autism, CAPD etc.), and shows learners who suffer from learning difficulties, one or more aspects of visual perception difficulties. It can be identified not only through the standardized tests, but also through direct observation of the visual behavior, as many of these problems can be dealt by following the appropriate treatment and training methods (Saqr, 2011).

A good number of empirical studies have focused on the role of visual perception in the process of educational learning (Pieters, Desoete,Roeyers, Vanderswalmen &Waelvelde, 2012; Abu Faadi, 2009; Garje, et al., 2015). Various studies prescribed effective programs in improving not only the visual perception but also the other senses of learners with learning difficulties (Mahmoud & Al nahdi, 2014; Badami, Mahmoudi, Baluch, 2016; Safaei, Bafrooeeb&Yarmohammadian, 2014). The results of these studies showed significant improvement in the skills of visual perception of pupils with learning difficulties. While other studies focused on using multiple senses as strategy to improve some skills of learners with learning difficulties; the findings emphasized on the effectiveness of multi-sensory strategy (Abdo, 2016; Hussein &Bajdaa 2016; Mayers, 2017; Albualez, 2006).

The present study aims to determine the effectiveness of a program based on a multi - sensory strategy in the development of visual perception of primary school learners with learning difficulties. Therefore the current study seeks to answer the question: Can a program based on a multi - sensory strategy of improving the visual perception of the primary school learners with learning difficulties?

Research Questions

The current study aims to address the following research questions:

a. Is there a difference in the level of visual perception among learners with learning disabilities following different teaching strategies (multi – sensory strategy /normal way)?

b. Is there a significant difference between the mean score of the experimental group of primary school learners with learning difficulties in their pre and post conduct of the program?
c. Is there a significant difference between the mean score of the experimental and control groups of primary school learners with learning difficulties in the pre and post-test after a month of the application of the program?

Hypotheses

a. There is no difference in visual perception at the level of statistical significance ($\alpha = 0.05$) among the pupils with learning disabilities in different teaching strategies (multi-sensory/normal way).
b. The statistical significance between the mean scores of the experimental group of primary school learners with learning difficulties in the two measurements (pre and post) of visual perception.
c. There is no statistically significant difference between the mean scores of the experimental group of primary school learners with learning difficulties in the two measurements (pre-test and post-test) visual perception after the passage of one month from the application of the program.

Importance of the Study

The importance of the study lies in the importance of the sample (Arabic speaking) to determine further course of studies and the recent trends in special education. It is a Multi - sensory strategy that helps us to identify the ways in which they can raise the awareness of learners dependent on the optimal employment of the senses. Improved visual perception among the learners with learning disabilities contribute to overcoming many of the problems, especially if this is done through multi - strategy senses. It would assist curricula designers by showing the importance and the crucial roles it plays in incorporating into the curriculum.

The importance of the study can be further determined as follows:The theoretical importance is to introduce the concept of multi - sensory

strategy and visual perception in line with the educational diversity of learning strategies. It is expected that this study will serve as an important scientific addition in the field of learning difficulties. The area of learning difficulties requires effort and intensive research to identify its characteristics and thus meet its academic and psychological needs. This study will further strengthen the effective use of multi-sensory strategy in dealing with various learning difficulties among the Arab learners.

The applied importance is to provide teachers with descriptive procedures related to the multi - sensory strategy. Moreover, this study identifies the strategy and its implementation to enhance the performance of pupils as well as the teachers in successful achievement of their course objectives. Planners take into account the application of multi - sensory strategy in the new editions of the school curriculum. It is anticipated that this study will help in the development of learning resources for learners especially those with learning disabilities such as teachers' guide etc. Furthermore, this study will help in improvising the existing training courses organized for teachers in the field

Objectives of the Study

The present study aims to identify the effectiveness of a program based on a multi - sensory strategy in the development of visual perception of primary school learners with learning difficulties. It also intends to measure the differences between the control and experimental groups so as to checks its effectiveness and prescribe recommendations for the various stakeholders like teachers and parents.

Limitations of the Study

The present study is limited to the sample of the kingdom of Saudi Arabia. The survey was conducted in 2017. The study sample comprised of primary school learners with learning disabilities.

Determinants of Study

The results of the study can be generalized in light of the findings based on the application ofthe programand the extent of circulation to a similar sample to ensure the reliability of the results.

Definition of the Technical Terms

a. *Estrategy of multi - sensory*: Itis a strategy that focuses on the use of different senses in teaching processes to resolve educational problems (Khatib, 2009).
b. *Visual perception***:** Is the ability to interpret the information and the surrounding visual light effects and the ability of the eye and the associated nerve centers to perceive the visuals through a series of processes that begin to convert the photon energy from the visible or reflected object to a neural signal in the retinal receptor level. The brain interprets it in a way that generates a personal sense of shapes, colors, size, movement and lustre (Suleiman, 2003).
c. *Learning Disabilities*: The cases of disorders in one or more of the basic psychological processes that include understanding and use of language (written or spoken), which can be observed in hearing, thinking, reading, spelling and arithmetic disorders. This is believed to be caused due to the injury of the brain functional aspects (brain injury or minimal brain dysfunction) and not caused by mental disability, be it related to audio or visual or other disabilities. Another definition of learning disabilities is that children, who suffer from the disorder in one or more of the basic psychological processes involved in understanding or using spoken or written language, may be seen in the weakness of listening ability, thinking, speaking, writing, misspelling or calculations for that matter (Abdo, 2016).

Review of Literature

There is a causal link between attention deficit and reading problems. Therefore, improvement in the attention skill does have positive impact on learners' reading skills as well (Franceschini, Gori, Ruffino, Pedrolli, &Facoetti, 2012). In the case of dyslexia, phonological awareness impairment is mostly common in developmental dyslexia but the dyslexic cases also have selective visual impairment that can cause reading difficulties (Snowling, 2000). The immediate concern here is that learners with reading difficulties lead to various issues like increase in dropout rate, delinquency or even suicide

cases (Denton & Al Otaiba, 2011; Benassi, Simonelli, Giovagnoli & Bolzani, 2011). The Individuals with Disabilities Education Act (IDEA, 1997) prescribed that learners with disabilities should have access to evidence-based instruction that is aligned with the grade level standards and make progress in the general education setting. Therefore, the educators have the responsibility to find intervention strategies and programs that have proven to be successful in an academic setting. As Kauffman (1996) states, "……special education is more urgent, more intensive, more relentless, more precisely delivered, more highly structured and direct, and more carefully monitored for procedural fidelity and effects" (p. 206, as cited in Vaughn & Wanzek, 2014). Researchers suggest that if the instructions are delivered in below average decoding skills and the content is delivered through different modalities, then the learners can cope with the standards of general educational curriculum with less effort. In order to become a fluent reader, a person is required to identify the words, understand its meaning from the text to complete the reading process and prove to have the desired skill. Mostly the learners with reading difficulties have weak phonemic awareness (Hines, 2009), and decoding words' meaning in the context maker the reader a fluent one (Magpuri-Lavell, Paige, Williams, Akins & Cameron, 2014). Multi-sensory strategy proves to be relevant in this situation wherein it bridges the gap. By teaching through a multi-sensory approach, the special educator instructs learners simultaneously through visual, auditory, and kinesthetic strategies to improve their memory and learning of new decoding skills (Todd, Campbell, Meyer & Horner, 2008; Boliek, Keintz, Norrix & Obrzut, 2010).

In learning disabilities cases the brain functions differently in terms of receiving and processing of the information or so to speak they have a different system of perceptual understanding of the things. These differences are reflected in their reading, writing, math, reasoning, listening and speaking skills. Problems in visual perception include, missing subtle differences in shapes, skipping words, misperceiving depth or distance, skipping lines, revering letters or numbers, or lack of eye-hand coordination. Problems in visual perception grossly affect fine motor skills, reading skills and numerical abilities. There are various studies focused on the variables i.e. weakness of visual perception when the learners with learning difficulties are

compared with normal cases (Bellocchi, Muneaux, Huau, Lévêque, Jover & Ducrot, 2017; Pieters et al, 2012). It was found in this study that 30 out of 106 leaners had difficulties in visual perception and motor skills. The 29% cases show that the situation is alarming and needed serious attention. However, research studies suggest that multi-sensory strategy for learners with learning disabilities has been found to be more effective than the other intervention programs related to the improvement in visual perception of special learners. The study of Alfassi, Weiss & Hefziba (2009) aimed to investigate the extent of difference in some cognitive characteristics of the visual ability in a sample of primary school learners with learning difficulties in writing and the ordinary learners. A selected sample consisting of 30 learners from the fifth grade who appeared to have learning difficulties were tested on visual perception which included visual discrimination, optical closure, perception of the relationship between the form and its components, visual integration and spatial relations, and visual information. The results of the study suggested a considerable difference between the learners with learning difficulties and the learners without any learning difficulties.

Garje et al (2015) studied the visual perception and integration of kinetic visual among the children with learning difficulties. The results pointed to the weakness of the cognitive visual aspects that influenced the academic efficiency, and the results confirmed that the early treatment of visual recognition provides long - term care of the learners. There are studies that dealt with improving visual perception for people with learning difficulties using a variety of programs that included activities related to various senses. Mahmoud &Alnahdi (2014) aimed to verify the effectiveness of remedial computer assisted education in the development of some visual recognition skills for pupils with learning difficulties in the second grade. In addition, the study applied by scale training program revealed significant improvement in the level of visual perception in the experimental group.

Badami, Rokhsareh, Mahmoudi, Sahar, Baluch and Bahman (2016) identified the effectiveness of the visual perception as a strategy to improve reading skill amongst the learners. The results showed that the cognitive vision exercises improved cognitive skills, visual and reading skills for children with dyslexia. Safaei et al (2014) established the effectiveness of a program based on visual perception to improve reading skill between the second graders with learning difficulties. Abdo (2016) used a multi - sensory

approach to treat writing difficulties in the third grade pupils. The result was in favor of the experimental group because of the application of the program; the program based on writing patterns by using a multi - sensory has a clear impact in the treatment of writing difficulties in the third grade learners. Abdo (2016) aimed to identify the effectiveness of the multi - sensory approach in overcoming learning difficulties (especially reading and writing). The result was in favor of experimental group that shows the effectiveness of the strategy.

In order to identify the effectiveness multi - sensory learning program for the treatment of some spelling difficulties among female learners with learning difficulties, Hussein & Bajdaa (2016) indicated that the statistics was in favor of the experimental group. In a similar study Albualez (2006) used multiple sense strategy to improve memory of children with difficulties in their learning and the results indicated significant improvement. Previous studies addressed some programs to improve visual perception (Mahmoud et al, 2014; Badami et al, 2016; Safaei et al, 2014). They used in these studies a variety of programs such as therapeutic computer - aided instruction based on cognitive skills and sports vision. Another group of studies has confirmed the effectiveness of multi- sensory strategy in improving some aspects of the deficiencies of the learners with learning difficulties(Mohammed, 2015; Abdo, 2016; Hussein et al 2016; Albualez, 2006).

Methodology

In this study quasi- experimental approach is followed to reveal the effectiveness of a program based on a multi-sensory strategy in the development of visual perception of primary school learners with learning difficulties.

Study Samples

The samples for the study are all learners with learning difficulties in special schools for the second semester of the year 2017/2018. Members of the study were deliberately selected from the learners of the primary stage of learning disabilities. Two groups were formed; the first group: experimental

group consisted of 30 individuals who have been taught with the strategy of multi - sensory, the second group: control group consisted of 30 individuals have been taught in the traditional way.

Tools

Multi - sensory strategy

The multi-sensory strategy ensured the development of visual perception among learners with learning difficulties in Saudi Arabia. In the first stage i.e. the foundation building strategy, number of total sessions, the duration of each session and the respective objective of each session were determined. Keeping in mind the current level of learners' performance participating in this study, required stability and flexibility in the application of the daily program was maintained so that necessary amendments could be carried out if found necessary. Researchers involved in this activity were required to make use of the materials and be available with the learners during the practice sessions as well as be involved in exchange of dialogue with the learners. The program should not be too tiring for the learners so that appropriate rest periods can be maintained for the effective implementation of the program. The program included three major parts: the first one focused on paper flyer, the second one focused on the articles from day-to-day life and the third one focused on articles identification. Each part was further distributed into two sessions (each one was of 40 mins). In the first part of the program, the learners were expected to infer the factual information from a given/narrated text and also expected to identify the related words used in the text. In the second part, the learners were made to identify the articles from the day-to-day life using their multiple senses. They were expected to infer the details related to shape, size, color, materials and its components etc. of the images or articles (visual stimuli) displayed. Based on their experience from the activities carried out in the first two parts, the learners were exposed to different articles where they had to do similar activities so as to enforce their previous learning and retention ability. (see Appendix 1).

Study procedures

The researcher conducted an initial exploratory study to ascertain the desired duration of the suitable training program for learners in terms of the activities and the tools allocated for each session and time. Pre-measurement was done to ensure parity between the control and the experimental groups in order to ensure that the improvement in the variables of the study is caused due to the training program (see Appendix 1).

First, all necessary official approvals were taken to maintain the ethical standards for the present study. The study sample was randomly distributed into two groups - experimental, and the control. After selecting the study sample, test of visual perception on a pre-study sample (control and experimental groups) was conducted. The teaching strategy was conducted as per use of multiple-senses on the experimental group. After the completion of program, appropriate statistical analysis was conducted of the collected data. Finally, interpretation of the results was discussed and recommendations were made based on the results of the study.

Statistical treatment

The use of statistical analysis was conducted using the SPSS program. SMA, Standard deviation and Test "T" ' was conducted to calculate the significance of differences between the groups. The size of the effect was calculated by using ETA square (H 2). The T test was conducted to identify the significance of differences between the mean scores of the experimental group for pre-test and post-test measurements. The T test was conducted to learn about the significance of differences between the averages of the experimental and control groups.

Results and Discussion

There is no difference in visual perception amongst pupils with learning disabilities in different teaching strategy (the traditional way, multi - sensory strategy). To answer this question, the arithmetic averages and standard deviations of visual perception in the pre and post measurements of the two

groups are calculated (the traditional way and multi - sensory strategy). The following table 1 below illustrates the results:

Table 1

Averages and standard deviations of the experimental and the control groups in pre-test and post-test measurements and averages with standard errors in the post-measurement

Groups	Pre-testmeasurement		Post-test measurement		Average	
	Average	Variance	Standard Deviation	Variance	Standard Deviation	Variance error
Thetraditionalmethod	1.4	0.101	1.72 0	0.06	1.721	0.011
Multi-sensorystrategy	1.418	0.116	1.815	0.07	1.813	0.011

The table 1 shows that the mean of the experimental group (multi - sensory strategy) in post-test is 1.815, while the average of the control group (traditional method) is 1.720.

To check whether there is a difference between averages in the post-test effect of teaching method (multi- sensory strategy), is statistically significant, common single analysis of variance (ANCOVA) is conducted. The following table 2 below shows that:

Table 2.
The results of ANCOVA of the variable groups (traditional, multi - sensory strategy)

Groups	Pre-testmeasurement		Post-test measurement		Average	
	Standard Deviation	Variance	Standard Deviation	Variance	Standard Deviation	Variance error
Experimental group (Multi-sensory strategy)	1.418	0.116	1.815	0.068	1.813	0.011

* The level of significance = 0.05 α

Table 2 shows that there is no statistically significant differences at the significance level (= 0.05 α). In the average measurement of the two groups control (traditional method) and experimental (multi - sensory strategy), the value of "f" is 35.538 in terms of statistical significance 0.00. Table 1 shows that the differences between the averages of the experimental group (multi-sensory strategy) and control group (traditional method) was 0.09. The result implied that the multi-sensory strategy was more effective than the traditional method of instruction.

Perhaps the reason for this is due to the quality of mental growth as determined by the growth and the accumulation of mental contents and mental functions, such as cognition, learning, problem solving, thinking, etc. The contents of the mental processes depend on the results of mental phenomena that is the so - called knowledge; this is what can be described as the contents of the child's mind. Effective perception recognizes the outside world through the senses and requires cognitive ability that gradually enhances through the child's senses. Multiple senses reinforce the data stored in the brain. However, among the other mental processes, the most crucial one is the recognition ability that should also be achieved during the first two years of life. Therefore, the use of multiple senses in teaching strategy helps the child to develop this ability in the growing child as well.

There is no statistical significance between the mean scores of the experimental group of primary school learners with learning difficulties in the two measurements; pre and post study in terms of visual perception. The

post-test result was in favor of the experimental group. To answer this, the averages and standard deviations account in the two measurements (pre and post) in the visual perception is evaluated and table 3 illustrates this.

Table 3
Averages and standard deviations in the two measurements: pre and post in the visual perception

Groups	Pre-testmeasurement		Post-test measurement		Average	
	Standard Deviation	Variance	Standard Deviation	Variance	Standard Deviation	Variance error
Experimental group(Multi-sensory strategy)	1.418	0.116	1.815	0.068	1.813	0.011

Table 3 shows the differences between the mean scores of the experimental group of primary school learners with learning difficulties in the two measurements (pre and post) in their visual perception. The result is in favor of post-test with 1.815, while the average of the pre-measurement was appeared to be 1.418.

The reason for this may be due to the visual growth aspect when in no specific time the learners realize the continuity of size and shape. It is the corrective action carried out by the brain to help the learners perceive distant objects of the same size that can be seen from a close distance. The results showed related differences in visual perception between the two measurements (pre and post) of the group received training using a particular strategy.

There are no statistically significant differences between the mean scores of the experimental group of primary school learners with learning difficulties in the two measurements (Pre-test and the Post-test) of visual perception after the duration of one month from the application of the program. To answer this question, the test application (Paired sample T-Test) to detect differences between the averages among the members of the experimental group in the development of visual perception is as a result of the strategy of multiple senses. This is illustrated in table 4 below:

Table 4

Test results of Paired sample T Test to detect differences between the averages among the members of the experimental group in their visual perception after multiple senses strategy

Variable	Measurement	Variance	Standard Deviation	Values "t"	Statistical significance
Visual perception	Post-test	1.81	0.07	0.067	0.947
	Pre-test	1.82	0.07		

Table 4 shows that there are no significant differences at the significance level (= 0.05 α) between the averages of the members of the experimental group due to the strategy of multiple senses in the two measurements (pre and post), which did not reach the values of "t" at the statistical significance level of 0.05 α. Perhaps the reason for this is due to the impact of the strategy of the multiple senses after a period, applied to members of the experimental group and therefore any differences did not appear on the post-measurement.

During the program, most of the participants provided positive feedback and showed signs that they were fully aware of the visual stimulus. All thirty participants identified the visuals presented from their multi-sensory experience. The attention level of the learners' increased substantially as these stimuli produced a greater impact on their learning (they were found laughing and excited while responding to various stimuli). Multi-sensory experience has been found to be effective in enhancing the learners' memory (Matos, Rocha, Cabral &Bessa, 2015), reading ability (Horchak, Giger, Cabral &Pochwatko, 2014; Taghvayi, Sh. Vaziri& Kashani, 2012; Wassenburg, De Koning & van der Schoot, 2015), numerical ability (Malekian, 2013). Though this study explored and tested nature of visual perceptions, this has further implication on developing other skills of the learners as well. The current practices in the area of reading comprehension proved that mental simulation training improves general reading comprehension and this study demonstrates how the learners connect their sensory-motor experiences to the visuals displayed for their various activities. The results of this study claim that visual perceptions are developed through multi-sensory experience but it is yet to be

explored further why third grade children responded more effectively than the fourth graders (Koning, Bos, Wassenburg&Schoot, 2017). Matos et al (2013) suggested that multi-sensory learning experience is found to be more effective than the audio-visual experience. In this study, the responses of the learners suggest that the multi-sensory program has significantly improved the visual perceptions of the learners.

Recommendations

The teachers specialized in special education need to use modern strategies in teaching wherein the learners are stimulated to use all the senses in various activities. It is necessary to take into account the mental age differences amongst the learners before implementing any particular teaching strategy. Moreover, the resource materials used for teaching purpose should conform to the mental age as well as the teaching strategy to be applied as the special learners do need distinctive care and attention. Specialized committees should be formed to ensure that the families are well aware of the structure of the programs so that their active involvement and encouragement could yield better results. Further studies should be carried out using a larger sample so that the other subtle gaps could also be addressed properly.

Conclusion

The results of the study indicate that there is a difference in skills of visual perception among the learners with learning disabilities in different teaching strategy (multi-sensory strategy/traditional method), and the differences were in favor of multi - sensory strategy. There is a difference between the average scores of the experimental group of primary school learners with learning difficulties in the two measurements (pre and post) in the visual perception and the differences in favor of post-study data. There are statistically significant differences between the mean scores of the experimental group of primary school learners with learning difficulties in the two measurements (pre and post) of visual perception after the duration of one month from the application of the program.

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References

Abdo, G. (2016). The effectiveness of the use of multi - sensory portal for the treatment of learning difficulties in primary school pupils Mind Hawks province. *The Magazine of Reading and Knowledge,* 181, 1-51.doi: https://dx.doi.org/10.4103%2F2277-9531.162372

Abdulhadi, B. (2009). *The impact of an individual educational program for the treatment of reading difficulties by using the method of multi - sensory Vernald (VAKT) for learners of third and fifth grade in the Directorate of Amman, the first public schools*. Doctoral Thesis. College of Graduate Studies: University of Jordan.

Abu Faadi, M. (2009). Compared to the characteristics of the visual perception of the two groups of primary school pupils with learning difficulties in studying writing and ordinary. *Journal of psychological studies*, *19*(*1*), 39- 77. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3917489/

Alfassi, M., Weiss, I., Hefziba, L. (2009). The efficacy of reciprocal teaching in fostering the reading literacy of students with intellectual disabilities. *European Journal of Special Needs Education, 24*, 291-305. https://doi.org/10.1080/08856250903016854

Afeafe, M. (2000). Special education in Saudi Arabia. Retrieved from http://www.khayma.com/education-technology/PrvEducation3.htm

Alajmi, N.(2006). *The Kingdom of Saudi Arabia: administrators' and special education teachers' perceptions regarding the use of functional behavior assessments for learners with intellectual disabilities*. Unpublished Doctoral Dissertation, Madison: University of Wisconsin-Madison

Albualez, M. (2006). *The impact of the use of multiple senses strategy to improve memory in children with learning disabilities*. Masters Dissertation. Guidance Special Education Department, College of Graduate Adarshat: Mutah University.

Allan, S. A, Ahmed, E. (2012). The effect of using interactive teaching method on academic achievement in the subject of learners in eighth grade of National Socialist basic education. *Damascus University Journal* –Alcild, *28* (IV), 525-544.

Almousa, N. (1999). *Development process of special education in Saudi Arabia*. Riyadh: Directorate General of Special Education in Saudi Arabia.

Almousa, N. (2010). *The Experience of the Kingdom of Saudi Arabia in Mainstreaming Learners with Special Educational Needs in Public Schools*. Riyadh: The Arab Bureau of Education for the Gulf States. Retrieve fromhttp://unesdoc.unesco.org/images/0019/001916/191663e.pdf

Al otaibi, B., & Al-Sartawi, Z. A. (2009). *Related services that are needed for the learners with multiple disabilities and their families in Saudi Arabia*. Riyadh: Directorate General of Special Education in Saudi Arabia.

Alwabli, A. (1996). Related services that are provided for learners with intellectual disabilities in special education institutes in Saudi Arabia. *Journal of Education*, *20*, 191-123. Retrieved from https://www.scirp.org/(S(lz5mqp453edsnp55rrgjct55))/reference/ReferencesPapers.aspx?ReferenceID=1504985

Badami, Rokhsareh, Mahmoudi, Sahar, Baluch and Bahman. (2016). Effect of sports vision exercise on visual perception and reading performance in 7- to 10-year-old developmental dyslexic children. *Journal of Exercise Rehabilitation*, *12*(6). 604-609.doi: https://doi.org/10.12965/jer.1632728.364

Bahman. G., Hayatib. A., Barazandehc. E. (2012). An evaluation of the effects of art on vocabulary learning through multi-sensory modalities. *Procedia Technology*,*1*,345 – 350.doi: https://doi.org/10.1016/j.protcy.2012.02.072

Bellocchi, S., Muneaux, M., Huau, A., Lévêque, Y., Jover, M., and Ducrot, S. (2017). Exploring the link between visual perception, visual–motor

integration, and reading in normal developing and impaired children using DTVP-2. *Dyslexia*, *23*, 296–315. doi: https://doi.org/10.1002/dys.1561

Benassi, M., Simonelli, L., Giovagnoli, S. &Bolzani, R. (2010). Coherence motion perception in development dyslexia: A meta-analysis of behavioural studies. *Dyslexia*, *16*, 41-357.doi: https://doi.org/10.1002/dys.412

Boliek, C ., Keintz, C ., Norrix, L ., &Obrzut, J. (2010). Auditory-Visual perception of speech in children with learning disabilities: the Mcgurk effect. *Canadian Journal of Speech -Pathology and Audiology*, *34(2*), 124-131. Retrieved from http://cjslpa.ca/files/2010_CJSLPA_Vol_34/No_02_81-152/Boliek_keintz_norrix_obrzut_CJSLPA_2010.pdf

Denton, C. A., & Al Otaiba, S. (2011). Teaching word identification to students with reading difficulties and disabilities. *Focus on Exceptional Children*, *43*(7), 1-16.doi: https://doi.org/10.17161/foec.v43i7.6911

Franceschini, S., Gori, S., Ruffino, M., Pedrolli, K. &Facoetti, A. (2012). A causal link between visual spatial attention and reading acquisition. *Current Biology*, *22*, 814-819.doi: https://doi.org/10.1016/j.cub.2012.03.013

Garje, M., Vishnu, D., Rashmi, Y., Arpita, A., & Maninder, S. (2015). Study of the visual and perceptual problems in children with learning disability. *Indian Journal of Basic and Applied Medical Research*, 4(3), 492-497.

Hamid, Hmam. (2007). The impact of self - expression and visual experience in the development of the children 's perception of Riyadh in the province of Diyala. *Conquest Magazine*, 31, 192 - 212.

Hines, S. J. (2009). The effectiveness of a color-coded, onset-rime decoding intervention with first-grade learners at serious risk for reading disabilities. *Learning Disabilities Research & Practice.24*(1), 21-32. doi: https://doi.org/10.1111/j.1540-5826.2008.01274.x

Horchak, O. V., Giger, J., Cabral, M., &Pochwatko, G. (2014). From demonstration to theory in embodied language comprehension: a

review. *Cognitive Systems research, 29*(30), 66 – 85. doi: https://doi.org/10.1016/j.cogsys.2013.09.002

Hussein, A. A., Bajdaa, A. (2016). Effectiveness of tutorial based on multisensory strategy for the treatment of some dictation difficulties for school girls with learning difficulties. *Global institute for study and research- Journal* (GISR-J) *2* (6), 1-32. Retrieved from http://www.gisr.org.uk/Layouts/PDFMagazine/Gisr2-6_20166.pdf

IDEA Partnership (2007). *Response to intervention: policy considerations and implementation*. Retrieved from www.ideapartnership.org/documents/RTI-intermediate-ppt-7-30-07.ppt

Interagency Committee on Learning Disabilities. (1987). *Learning disabilities: A report to the U.S. Congress*. Bethesda, MD: National Institutes of Health.

Isa, S., Ishak, I., Rahman, A., Saat, D. N., Ismail, M. (2017). Coping stress perceived among the styles of Malay caregivers children with learning disabilities. *J Med the Sci Malays, 24*(1), 93.https://doi.org/10.21315/mjms2017.24.1.9

Kandari, M. (2017). The effect of using structural evaluation methods on achievement and self - esteem among learners with learning difficulties in primary school in Kuwait. *The Magazine of Reading and Knowledge, 1*(84), 53-85.

Karam, L., &Kaoud. A. M. (2015). The effectiveness of using method Vernald (Method of multiple senses) in reducing the problem of reading (dyslexia) in a sample of primary school children. *Childhood Studies*, *18*(67), 41-45.

Khatib, Akef Abdullah. (2009). *Room sources as an alternative for people with special educational needs (A practical guide for teachers)*, Jordan: Modern world of books.

Koning, B. D., Bos, L.T.,Wassenburg, S. I., Schoot. M. (2017). Effects of a reading strategy training aimed at improving mental simulation in primary school children. *Educational Psychology Review*, 29, 869-889.doi:https://doi.org/10.1007/s10648-016-9380-4

Kurtz, L. (2006). *Problems with perception in the visual children with the ADHD and other learning disabilities: A guide for parents and professional,* Jessica Kingsley Publishers: London and Philadelphia.

Magpuri-Lavell, T., Paige, D., Williams, R., Akins, K., & Cameron, M. (2014). The effects of a summer reading program using simultaneous multisensory instruction of language arts on reading proficiency. *Reading Improvement*, *51*(4), 361. Retrieved from https://eric.ed.gov/?id=EJ1095735

Mahmoud, A., Alnahdi, G. (2014). The effectiveness of remedial education computer aided in the development of the skills of visual perception of pupils with learning difficulties in the second grade primary. *Journal of Special Education, 8*, 101-147.

Malekian, F., Aksari, B. (2013). Investigating the effect of multi-sensory games on decrease of male students' dyslexia (Based on Goodman Theory) specified for elementary school second grade in Aligudarz city. *Procedia - Social and Behavioral Sciences*, *82*, 796 – 802.https://doi.org/10.1016/j.sbspro.2013.06.351

Matos. A., Rocha. T., Cabral. L., Bessa. M.(2015). Multi-sensory storytelling to support learning for people with intellectual disability: an exploratory didactic study. *Procedia Computer Science,67*, 12-18.doi: https://doi.org/10.1016/j.procs.2015.09.244

Mayers, L. P. (2017). *The effects of a multi-sensory program on students with disabilities*. Specialist in Education Degree (Ed.S) Theses. 12. Retrieved from http://kb.gesu.edu/eds/12

Ministry of Education of Saudi Arabia. (2002). Rules and regulations of special education. Retrieved from https://www.moe.gov.sa/Arabic/PublicAgenciesAndDepartments/BoysEducationAgency/SpecialEducation/DocumentsLibraries/RulesAndRegulations/se_rules.zip

Ministry of Education of Saudi Arabia. (2012). Statistical manual of institutes and special education programs for the academic year 2012/2013.

Mohammed, A. (2013). Multi - sensory attention to the development program of the effectiveness of the primary school pupils with learning difficulties reading. *Journal of Special Education,* 4, 114-126.

Mohammed, J. (2015). *Program proposal is based on written patterns by using a multi - sensory approach in the treatment of writing difficulties in school pupils primary*. Master Thesis. Faculty of Education: Mansoura University.

National Joint Committee on Learning Disabilities (1997). Learning disabilities: Issues on definition. *Collective perspectives on issues affecting learning disabilities: Position papers and statements*. 61–66. Austin, TX: Pro-Ed.

Pieters , S., Desoete , A., Roeyers , H., Vanderswalmen , R., &Waelvelde, H. (2012). Behind mathematical learning disabilities: what about visual perception and motor skills? *Individual Differences in learning, 22*(4), 498-504. doi: http://dx.doi.org/10.1016/j.lindif.2012.03.014

Safaei, L. Bafrooeeb, K. Yarmohammadian, A. (2014). The Effectiveness visual of perception skills to improve reading performance of elementary second grade learners with learning disabilities. *J.Sci.Resindian*, *7* (1), 269-274.doi: https://pdfs.semanticscholar.org/9c81/50b0cb72afeeae44b8cb612b0881881f0266.pdf

Saqr, A. K. (2011). The effectiveness of a training program for the development of the skills of visual perception difficulties in writing the third grade learners of the first episode of basic education. *Journal of the College of Education*, *21*(2), 135-224.

Snowling, M. J. (2000). *Dyslexia*. Blackwell: New York.

Suleiman , Hamid. (2003). *Learning difficulties and visual perception "diagnosis and treatment"*. Cairo: Daralvkraraba.

Taghvayi, D., Sh. Vaziri, F., Kashani. L. (2012). The Effectiveness of Integrative Approach, Fernald Multi-Sensory Technique on Decrease Reading Disability. *Procedia - Social and Behavioral Sciences.* 69. 1264-1269.https://doi.org/10.1016/j.sbspro.2012.12.060

Todd, A., Campbell, A. Meyer, G., Horner, R. (2008). The effects of a targeted intervention to reduce problem behaviors elementary school implementation of check in–check out. *Journal of Positive Behavior Interventions*. *10*(1), 46–55. https://doi.org/10.1177/1098300707311369

Vaughn, S., & Wanzek, J. (2014). Intensive interventions in reading for students with reading disabilities: meaningful impacts. *Learning Disabilities Research & Practice, 29*(2), 46–53. https://onlinelibrary.wiley.com/doi/full/10.1111/ldrp.12031

Wassenburg, S. I., De Koning, B. B., & van der Schoot, M. (2015). Effects of an inconsistency-detection traning aimed at improving comprehension monitoring in primary school children. *Discourse processes*, *52*, 463 - 488. doi: https://doi.org/10.1080/0163853X.2015.1025203

Zayat, F. (1998). *Learning difficulties, theoretical foundations, diagnostic and therapeutic*, Publishing House of Women University.

Znkor, M. (2014). Educational site in the light of the interactive e - learning management and its impact on the development of cognitive skills and the generation of information systems at the primary school learners excelling mentally with learning difficulties in mathematics in the Kingdom of Saudi Arabia. *Journal of Mathematics Educations, 17*(5), 6- 130.

Appendices

Appendix 1. Multi-sensory program

Multi-sensory program

A training program includes sessions that include distractions and exercises that attract learners' attention visually. The program included the following sessions;

First session: Paper Flyer: The session consisted of two training sessions (each session = 40 minutes); the activities and training of visual perception were presented.

Second Session: Article from day-today life: The session consisted of two training sessions (each session = 40 minutes); the activities and training of visual perception were presented.

Third Session: Article identification: The session consisted of two training sessions (each session = 40 minutes); the activities and training of visual perception were presented.

First Session:

Paper Flyer

Activity

Firas saw a paper fly and said, “Dad! I want a flyer like this”.
Father said, "Come, let us make one. Firas! We need thread, paper and glue for this”.

His father cut the paper and Firas made the tail of the plane and colored it with beautiful colors. He told Firas to tie the flyer with the thread and release it in the air.

Firas said, "Father! You did it so well".
Firas asked, "How do we make a flyer ride?"
Father said, "With the help of science and we can do whatever we want".

Training on visual perception

1. WhatdidFirassee?
2. WhatdidFirasask?
3. WhatdidFirasbring?
4. Who made the tail of the plane?
5. What Firas tied the flyer with?
6. How can we make the flyer fly like a real plane?

Read the word below and circle around the matching word from the activity.

Tail	wail	sail	tail
Science	waince	mince	science
Want	went	rent	want

Read

Talal, Noman and Firas went to the stadium. Talal brought a kite and Firas brought a football. The boys played a lot. After the game, Talal collected the waste in a bag.

Read every two words and note that deleting any word leads to a new word:

ba:b	duba:b	(Door flies)
Firas	ra:s	(Name head)
nɔ̂ra'	nɔ̂ra	(We see)
kitab	ta:b	(Book repentance)
Nizar	za:r	(Name visited)
Sa:fɔ̂raa	sa:raa	(Travel walk)

Second Session:

Prompt: There is material around us everywhere.

Article around me:

Everything around me I feel is a substance e.g. my body etc. Materials I breathe, see, hear, feel, smell, and taste are different forms of substance.

1. Forms are displayed through different images among learners.

   Materials vary in their components:

   Different forms are displayed through different images/objects among learners:

   a. The cup consists of pottery
   b. The sharpener is made of metal
   c. The ruler is composed of wood material
   d. The game consists of a plastic material
   e. The air inside the balloon consists of gases

   What are the benefits of the images/objects displayed?

2. What are the characteristics of displayed materials?

   Answer: Materials are displayed and its features are asked to identify (e.g. shape, size, color, components etc.)

3. Different forms are displayed through different images among the learners to let them identify the articles.

   Activity: Each article occupies its own place (place)

   Props for the activity: a cup filled with water, a cup of water to the middle, a stone, and a thread. I put the stone in the cup so as to raise

the water level to the middle of the glass. Can you do this without the water pouring out of it? How does it happen? Why does it happen?
The size of the material is the space or place to occupy; each material has a space of its own. The materials of large size occupy large space, and so do the small materials occupy small space.

Third Session:

Look at the pictures, and notice:

1. Articles: Which one contains more wood; the wood reservoir or the chair?


Which is heavier: the chair or the wood reservoir?

2. Different shapes are displayed through different images among the learners.


The cabinet contains more wood, so the cabinet is heavier than the chair.

3. Which bottle in the picture has more water?

(a)

(b)

Which is heavier? Why?

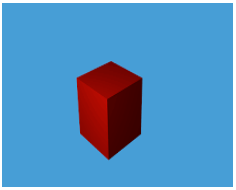
4. Display corrupted formats through different images among the learners.

Glass contains more water than the bowl?

Body mass: The amount of material in it. It is known that all materials have common characteristics i.e the space occupied by them.

Identify the articles around and compare the objects in terms of their mass. What are the common characteristics of the objects?

Different forms are displayed through different images among learners.



a. It has a spherical shape.
B. It has red color.
C. It's a block
D. It has a rough feel.
e. It's a space.
f. It is composed of wood

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