Implementation of Multisensory Instruction for Dyslexic Students in an Inclusive Classroom Setting

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Approval

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Dedication

Dedicated to my parents for their unconditional love, prayers and support throughout my life

Certificate of Originality

I hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any degree or diploma at NUST SEECS or at any other educational institute, except where due acknowledgement has been made in the thesis. Any contribution made to the research by others, with whom I have worked at NUST SEECS or elsewhere, is explicitly acknowledged in the thesis.

I also declare that the intellectual content of this thesis is the product of my own work, except for the assistance from others in the project's design and conception or in style, presentation and linguistics which has been acknowledged.

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Table of Contents

List of Abbreviation

LD	Learning disabilities
DIBELS	Dynamic Indicators of Basic Early Literacy Skills
DST	Dyslexia Screening Test
RAN	Rapid Automatized Naming
NWR	Non-Word Repetition
SD	Signs of Dyslexia
IRA	Interpersonal Relationship Anxiety
TR	Teacher's Rejection
IDEAS	Institute of Dyslexia Education & Attitudinal Studies
ISF	Initial Sound Familiarity
LNF	Letter Naming Familiarity
PSF	Phoneme Division Familiarity
NWF	Non Word Familiarity
DORF	DIBELS Oral Perusing Familiarity
CBM	Curriculum-Based Measurement
IDA	International Dyslexia Association

List of Figures

List of Tables

Abstract

Dyslexia is a phonological problem, which causes problem in reading and writing. It affects throughout the life; however its effects can change at various stages. It exists from mild to severe. Hence, not every dyslexic student needs a special treatment from specialist. At-risk or mild student can depend on skilled teachers.

A dyslexic's brain is wired differently that affects processing of receiving and decoding of information. Due to different connectivity, conventional teaching practices are not enough to deliver the information in a way that would make it easy for at-risk dyslexic student to understand and make sense. Even stagnant graphics, pictures and diagrams cannot do justice to their learning.

Multisensory instruction benefits at-risk dyslexic students to learn using five senses. It involves the use of visual, auditory and kinesthetic pathways, simultaneously, to enhance memory and learning of reading and written language (Richard & Rebecca, 2005). Creative teaching methods, using more than two senses, can affectedly improve academic outcomes and language skills of students at-risk of dyslexia (Birsh, 2005).

At-risk dyslexic students learn more effectively in a regular inclusive classroom setting where they are not labeled but given an importance as everyone else. In an inclusive classroom teacher uses multiple approaches (i.e. multisensory instruction) to deal with at-risk dyslexic and with no-risk of dyslexia students; for support in their learning.

In this study, a quasi-experimental research was conducted to check the impact of multisensory instructional approach in learning of grade 1 at-risk dyslexic Pakistani students. This study involves 51 at-risk dyslexic students. The pre-experimental: one group pretest-post-test design was employed.
The resulting effect size was 0.88, therefore a strong effect was found and it was concluded that use of multisensory instruction in a Pakistani context considerably increases learning of 'at-risk' dyslexic students.

1.   Introduction

1.1. Background

"Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing it's stupid." -Albert Einstein.

Every child is special, with distinctive combinations of abilities and necessities that affect learning (UNICEF - Teachers talking, 2001; Qiong, 2016; National Council for Special Education, 2014). Every child as a learner has their own style of learning (UNICEF - Teachers talking, 2001; Guild, 2001). Learners differ from one another in different ways that includes how they approach their studies, respond to types of instruction they have been given, and their behavior towards nature of knowledge (Richard & Rebecca, 2005). There are generally three types of learning styles through which a learner learns: auditory, visual, or kinesthetic. Each learner has its own style of learning, and with different learning styles it gets challenging for a learner to learn in a behavioral classroom setting. At early age, children tackle problem in reading, writing or in math but if it remain consistently, that might indicate a learning disability which is hidden yet dangerous.

Lack of awareness of learning disabilities has made parents, teachers and students to suffer understanding the problem student is suffering. Student with learning disability get label of irresponsible. Parents most often feel guilt and anger when their child exhibits slow learning in reading and writing (Gayle, 2015). They desperately want to identify 'the cause'. If parent do not find the cause behind slow learning of their child they start self-blaming or blaming a teacher. A teacher who is unaware of the learning difference known as dyslexia might assume that such students are inattentive or lazy, when in fact they are struggling at their own (Dowson, 2003). Having a learning disability is always a threat to a child's self-esteem. A child with learning disability takes more time and parental attention and feels rejected when not getting it (Sally, 2002). Similarly, dyslexic students experience plenty of stress due to academic problems. They frequently end up feeling less competent than non-dyslexic (Dowson, 2013).

1.1.1 Learning Disability

Disability is a state which limits a person's senses, movements or activities (Oxford Dictionary). Learning disability is a neurological processing problem. It is a state giving upswing to difficulties, especially when associated with any physical handicap, in obtaining knowledge (Gina et. al, 2016; Sheldon, 2016 & Peg, 2014). These processing problems i.e. learning disabilities interfere child's learning basic skills of reading, writing and / or math ((Candace & Sheldon, 2014). Learning disabilities affect the impact of reading, writing and math calculations. They also affect other conditions such as behavior towards people and studies, attention and language.

Reading learning disabilities characteristics vary from one to other. Some of the most common comprise (Erica, Rachael, & Lauren, 2016):

- Difficulty in Phonemics awareness
- Difficulty in Phonological processing
- Difficulty in Word decoding
- Difficulty in Fluency
- Rate of reading
- Rhyming
- Difficulty in Spelling
- Vocabulary
- Difficulty in Comprehension
- Difficulty in Written expression

Learning disability is not a disease that can be cured with medicine but it means that brain is 'wired' in a different way (Peg, 2014). A child with a learning disability needs special attention from instructor and parents. The only treatment for children with learning disability is to teach them in their own learning style. According to experts in the field learning differences and disorders "Learning disabilities are not a prescription for failure. With right kinds of instruction, guidance and support there are no limits to what individuals with learning disabilities (LD) can achieve (Candace & Sheldon, 2014, p. 3).

1.1.2. Dyslexia

Dyslexia comes under the umbrella of different learning disabilities. The International Dyslexia Association in 2002 defines dyslexia as a language-based learning disability considered by difficulties with spelling, correct and/or fluent word recognition (Israel & Wendy, 2006). International Dyslexia Association further specifies that "these learning difficulties usually result from a unavailability in the phonological component of language and are unexpected in relation to academic abilities, age and other cognitive abilities" (Israel & Wendy, 2006, p. 1).

Being a dyslexic does not mean that the child or an adult is not intelligent but it is a difficulty in which they otherwise possess motivation which is considered to be necessary for fluent and precise reading (Sally & Bennet, 2003). Sally and Bennet have explained in their article that "two primary processes are required in reading: decoding and comprehension. The unavailability of phonological component in dyslexia harms the ability to divide the written word into pieces and phonological elements. Since brain does not perform its task the way it should, a child with dyslexia practices face troubles in decoding and identifying written word" (Sally & Bennet, 2003). Because of unavailability of phonological component a child with dyslexia experience complications with other language skills such as pronouncing words, spelling, and writing.

Children with dyslexia are cognitively and neurologically distinctive from others in terms of reading difficulties; on the other hand the precise cause of dyslexia is still not entirely clear. Many studies have shown that it is a neurological disorder with genetic origin (Ramus, ;2003 Martha, 2014 & Christian, 2016). According to Wines (2002) 'dyslexia occurs in people of all backgrounds and intellectual levels (p. 1). Of people with reading difficulties, research has observed it is likely that between 5-10% of the population has dyslexia (Mary, 2012). Although dyslexia is a reading difficulty; however it is not necessarily that any child with a reading difficulty be termed as being dyslexic (Louisa & Ed, 2010; Dowson, 2003 & Sue, 2012).

3

1.1.3. Multi-sensory instructional approach

Multi-sensory instruction means to teach in such a manner that it appeals to the five senses. It involves a string of sensory approaches for associating eyes, voice and hand movements to learning (James & Rahima, 2008). It embraces different learning styles i.e. visual, auditory, kinesthetic and tactile. A multi-sensory instructional approach recommends that learners learn best when learning material is displayed in different arrangements (Mercer & Mercer, 1993; Judith, 2011).

Students learn through audio, video, hands-on activities which let brain to activate all the senses. For example: students say the word what they have been taught by the teacher, rewrite it and check it through their touch sense. Erase it and write that word again from memory, confirm and repeat entire process. It is a varied approach that indicates all students paying little attention to their favorite learning style (Moustafa, 1999 & Harvey et. al, 2000).

It is believed that learner learns best while utilizing different senses (Tilly, 2008). Use of multi senses in multi-sensory instructional approach let students to learn in their style of learning at their best. Thus, Multi-sensory instructional approach is effective for all learners.

1.1.4 Inclusion

Inclusion means to include every student in a regular classroom, sitting together with same-age peers, even if they have any disability; physical or learning (Peter & Mel, 2002; see also David & Anne, 2002). An inclusive classroom is a general mainstream in which learners (with and without disabilities) learn collectively (Hughes, 2015 & Jasper, 05). Instructor accepts the diversity of students in inclusive classroom, and assisting all students to access course content and participate in learning. Johan and co (2015) discussed with reference to UNICEF discussion paper that inclusion brings confidence in students with any physical or learning disability to their real contribution in society on an identical basis.

1.1.4 DIBELS Next

The Dynamic Indicators of Basic Early Literacy Skills (DIBELS) is an arrangement procedures and measures for evaluating the securing of early literacy skills from kindergarten through sixth grade (Roland & Ruth, 1993). DIBELS is a set of tasks planned to assess students' fluency with fundamental reading skills (Diane & Michelle, 2001). The DIBELS tasks are used to screening that could be depicted as a movement of the foundational aptitudes of early reading. DIBELS is designed for the use in identifying children experiencing difficulty in acquisition of basic early literacy skills in order to provide support early and prevent the occurrence of later reading difficulties. The skill areas assessed include phonological awareness, alphabetic principle, and fluency with connected text. These skills are essential to reading success (Diane & Michelle P., 2001 & Good, Kaminski, & Hill, 2000).

1.2. Rationale

Learning disability is a reading disability that causes problems in learning. It affects learner's academic and personal life if not treated at earliest. Unfortunately, due to lack of awareness in Pakistan very few schools identify learning disabilities in students. Dyslexics are labeled as slow learners or dumb. They do not understand the real cause behind that laziness or slow learning. Students with learning disability are normal like any other student (Gina, Melinda, & Jeanne, 2016). They may not do well in reading, writing or in math but good in some other things as arts, creativity, sports and music etc.

Dyslexia is a learning disability which happens due to problem in phonological component of language. Phonological area helps to recognize and organize words. Dyslexia is categorized by difficulties with accurate and / or fluent spelling and word recognition. It is widespread in population among student with learning disabilities. Studies have shown dyslexia found in ratio of 1 in 5 (Shaywitz, 2013, see also Siddiqui, 2011). Dyslexic students lose their self-esteem and face many problems in every step of life (Jesna & Monsy, 2014). They feel ashamed as they are the problem for the society. They are not good in reading and writing at the same time as they are good in other things like arts, drama, music etc.

One of the real issues of the students, particularly with learning disabilities, in Pakistan, is that their learning problems are not appropriately identified, analyzed and treated (Mahmood, 2010). Fatima and co (2014) concluded in their study that it is failure in education system and faulty teaching strategies that has affected the achievement of learning in Pakistan. Dyslexia is a myth (Fatima, Zahid, & Sadia 2014).

Studies have shown teachers and parent's attention towards dyslexic students has a great impact (Deepti, 2006; Kimberly, 2012 & Shaina, et al., 2016). The awareness in parents and teachers may help dyslexic students by identifying the problem and managing it accordingly. Teachers need to assess students by keeping in mind their real deficiencies and not only by their performance. Students quit learning when they are being bullied or misunderstood by their late learning (Khan & Mohsin, 2013). In one of the studies Foreman-Sinclair (2012) finds a positive result in mean which indicates a dire need of an immediate and intense action in teacher training in both the area of assessment and the future possessions of retaining students.

Students with learning disabilities need special treatment to overcome with their disability. Although labeling makes it easier to support but the effects are problematic for mental and stress (Nicola, 2009; Suharto, Pim, & Pat, 2016). Inclusion is the answer of such condition. Inclusion means to include different types of learners, including student with disability and student without learning disability, in one regular classroom setting. UNESCO's global movement Education for all gave rise to the concept of inclusion (Unicef, 2007). Inclusion teaches both types of learners, with and without disabilities, to give respect to each other. Students with and without learning disabilities learn equally in an inclusive classroom setting.

To cater to different types of learning, multi-sensory instructional approach works efficiently. Multisensory teaching links many brain zones and information with sufficient speed and accuracy (Mary, 2012). It involves the use of different senses i.e. visual, auditory and kinesthetic pathways simultaneously. This use of different senses enhances memory and knowledge of written language. Multisensory instructions

benefit dyslexic students in an inclusive classroom to learn in effective way. They get the confidence to learn like non-dyslexics.

1.3. Study Overview

This study aims to reduce the gap between at-risk or current dyslexic students in Pakistani classrooms and the way content is taught to them. It employs the use of a multisensory approach to instruction – in a particular English language instruction in an inclusive classroom setting, in which dyslexic students sit with non-dyslexic students.

It was intended to examine the effects of multi-sensory instruction approach on English subject as teacher pedagogy in an inclusive classroom setting. Inclusive classroom included student with and without learning disability. The study was though done in an inclusive classroom setting but the focus was on at-risk dyslexic students.

The research problem was to examine the impact of multi-sensory instructional approach of Grade 1 English, in aiding at-risk dyslexic students' effective learning. A quasi experiment – pre-experimental design: one group pretest-post-test design was conducted through pre-test post-test, weekly class test and observations during intervention phase. The sample size was one hundred and twenty six (126) students of grade 1. After analyzing quantitative and qualitative data, significant difference in the means of sample at different occasions is found with a strong effect size. Therefore, it was concluded that multi-sensory instruction as a teaching methodology increases the learning of at-risk dyslexic student.

The study had limited time for intervention phase which may be counted as limitation for conducting this study. A longer study covering a large portion of curriculum would potentially further support the findings.

2. Literature Review

Learning disability is not an issue with cleverness or inspiration motivation. Students with learning disability are not lazy in their studies but their brain is connected differently that affects process of receiving and decoding of information (MacDonald, 2014; & Kimberly, 2006). A teacher who is aware of learning disabilities and a keen observer of students can easily distinguish between a lazy student and student with learning disability. It is already stated that learning disability is not a disease that can be cured. However, with proper support student can succeed in school and career (Kimberly, 2006).

Dyslexia is a type of the learning disability which can be distinguished certainly by the teacher. Students at their early age take time to learn English, both - as a first or as second language. Early identification of learning disability benefits student to overcome the problem. Preferable age for screening student is age of around 6 - 7 years (Pickering, 1995).

According to Lane (2007) brain has an arrangement of behavior that enables human to learn new things. Everyone has their own style of learning. It is teacher's responsibility to understand students' learning style and teach accordingly. Such type of learning environment can be achieved in inclusive classroom setting. Inclusive classroom setting includes every type of learner whether visual, auditory, kinesthetic or tactile (Amy & Rebecca, 2009). It includes different types of learners under one roof – students at-risk of dyslexia and student with no dyslexia (Sylvia, 1996; Cecil et. al, 2014).

Ladan & Aaron (2008) writes about multi-sensory instructional approach that it helps at-risk or dyslexic students to learn how to read and write. Several studies have shown the direct code approach as multi-sensory instructional approach gives wonderful results in basic reading and writing (Adams, 1990; Malatesha, Mary, & Regina, 2002 & Lay, 2016). In another study Vanessa et. al (2014) have concluded that at-risk or dyslexic students profit less from mixing the two senses (i.e. text and audio), since they have large irregularity in their senses.

2.1. Dyslexia

Dyslexia is an invisible phonological problem which causes problem in reading and writing. Duncan (2005) explains about dyslexia that it is a condition that disturbs the capability to attain reading skills, which creates problems in writing. Many researchers believe that dyslexia is a phonological difficulty which is the skill to recognize and manipulate the structure of words (Sally & Bennet, 2003; Kimberly, 2006; Salter & Hendrickx, 2009). Duncan (2005) highlighted that dyslexics may have problems sounding out words or accessing whole word forms; they find problem in other language skills such as pronunciation, reading and writing.

Dyslexia is a life-long condition that affects a learner's self-esteem and socio-emotional development throughout life (Dyslexia International, 2014). Despite of typical training, dyslexia causes troubles constantly in getting adequate reading abilities (Snowling, Bishop, & Stathors, 2000).
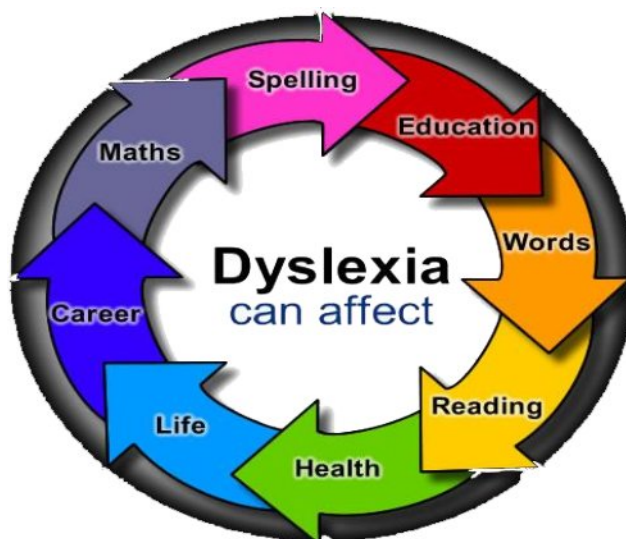

Figure 1 (Kate, 2014)

Figure 1 explains affection of dyslexia. Dyslexia affects math, reading and writing. The problem in reading and writing causes dyslexic student difficulty in getting proper education. Poor education disturbs dyslexic students mentally that brings health issues. Without proper education, dyslexic finds difficulty in finding good career.

Worldwide dyslexia has been studied for around 200 years now. The idea and term dyslexia started in the late 1800s when two researchers - Dejune and Bastian found that an assortment of neurological issues represented perusing issues in their patients (Karen, et al., 2002). However, the root cause of dyslexia is not clear yet. In one of the psychology study, Wines (2002) found structural and brain imagery point to contrasts in the way the brain of a dyslexic individual expands. In one of the other studies of behavioral neuroimaging test, surveys showed dyslexia is associated with cerebellar shortcoming in around 80% of cases (Nicolson, Fawcett, & Dean, 2001). They further discussed that disorders in cerebellum development is basis of impairments in writing and reading characteristic of dyslexia (Nicolson, Fawcett, & Dean, 2001, p. 508). Fletcher (2004) observed in his study of dyslexia, that it keeps running in families, and it is connected with discourse and dialect troubles.

A key factor in dyslexic reading difficulty, found in one of Wines (2002) studies, is recognizing the different discourse sounds within a word and additionally figuring out how these letters speak to those sounds. In Sally and Bennet (2003) article, they have concluded that children who have dyslexia are not likely to just seeing letters or words backwards but found huge trouble in naming the letters, regularly calling 'b' as 'd' and reading 'saw' as 'was'. Some of the signs and symptoms of 'at-risk' dyslexia are as follow:

- Slow, laborious oral reading
- Difficulty pronouncing words
- Difficulty learning the alphabet, nursery rhymes, or songs
- Difficulty with hearing and deploying sounds in words
- Difficulty distinguishing different sounds in words
- Difficulty in learning the sounds of letters
- Misreading or omitting common short words
- Spelling mistakes
- May do well on weekly spelling tests, but may have many spelling mistakes in daily work

Poor reading comprehension during oral or silent reading, often because words are not accurately read

- Difficulty following directions
- Difficulty putting ideas on paper

Dyslexia is not a condition which cannot be distinguished from the students who deferred alternately in reverse in figuring out how to read (Presland, 1991).

Some of the myths and facts about dyslexia from different researchers are as follows: (Futterman, 2014; Burns, 2015; Lapkin, 2014; & clinic, 2014)

<u>Myths</u>
- Read backwards
- Reversal of letters
- Dyslexia is caused by a lack of phonics instruction
- Every child who struggles with reading is dyslexic
- It is a visual problem
- Smart people cannot be dyslexic, if you are dyslexic you cannot be smart
- Dyslexia cannot be diagnosed until third grade

<u>Reality</u>
- Dyslexic appears highly intelligent but unable to read, write, or spell
- Talented in art, music, sports
- Poor concentration
- Confused by letters, numbers, words, sequences, or verbal explanations
- Needs to see or hear concepts many times to learn them
- Forgetful of words
- Inconsistent school work

Large number of literatures has been published on the widespread of dyslexia. Few researchers have concluded in their studies that one-half from a large number of population of students who qualify for special education are having a learning disability and eighty five percent of students found problems in language processing and reading (Wines, 2002; & Thomas & Schulte-Körne, 2009). Sapfford and Grosse (2005) write in their book that around one and one-half to five percent of the population has some symptoms of dyslexia. Dyslexia has been found in students of all backgrounds (Fontenelle, 2002; & Nielsen, 2009). Students with learning disabilities

are not less intelligent. Bright students can be found as dyslexic. Dyslexic students are capable of doing things where language skills are not required such as drama, arts, music, mechanics, computer science, electronics etc. (Claire, 2009). Students with dyslexia are neurologically and psychologically particular from students without dyslexia with reading challenges (Woollams, 2013).

One of the great parts of research on dyslexia is done in English-speaking countries. Seymour, Aro & Erskine (2003) has concluded in their article that learning to read English is tougher than learning to read other orthographies. A considerable amount of literature has been published to explain different orthographic similarities. One of the studies conducted on Germany and English speaking children showed that the similarities between dyslexic readers using different orthographies are far bigger than their disparities (Ziegler, Ma-Wyatt, & Schulte-Korne, 2003).

A related study by Catts in 2002 found that children with language impairment in kindergarten were at high threat for reading disabilities in second and fourth grade. There are a large number of published studies describing the role of early identification and aid to children diagnosed with language impairment. Students whose spoken language abilities improved in kindergarten had better word identification and reading understanding outcomes (Israel & Wendy, 2006). Dyslexia is not due to either lack of intelligence or desire to learn; with appropriate teaching methods, dyslexics can learn successfully (Wines, 2002).

2.2. Dyslexia in Pakistan

In recent years, there has been an increasing amount of literature on dyslexia in Pakistan. In one of the study in Lahore, Ashraf and Majeed (2011) distinguished dyslexia in 6, 7 and 8 grades school. The sample for the research was the student's government schools with age between 11-17 years. The aim of the study was to screen out at-risk of dyslexia for that they used Bangor dyslexia test, Slossan Intelligence Test and the academic record of the students. Out of the aggregate sample 5.37% students were found dyslexic. The result showed that in grade 6 and 7, male students were more predominant figure in being dyslexic than female students. While in 8 grade, the rate did not change much in both the genders (p. 81).

In another study, Muhammad et. al (2013) have found 5.57% students at-risk of dyslexia. The sample of the study was the students of private schools in the age range of 6 ½ - 11 ½ years. Researchers used dyslexia screening test (DST) and demographic information to assess at-risk of dyslexia. They found no significant difference in mean of age and gender. However, they found mean difference of family monthly salary (p. 03).

Dyslexia is a phonological learning disability. It can not only be diagnosed through English phonics or phonemes but with other languages. Tariq& co. (2011) make a battery to test dyslexic students in Urdu language. They concluded a significant effect of battery which was especially developed, tested and then validated. They applied test on students of grade 6 and grade 7 for the validation of the battery. In 2014, Ammara & Mila determined that dyslexia is a phonological learning disability. This study was to check the impact of rapid automatized naming (RAN) and non-word repetition (NWR) on Urdu orthographies. This study comprised one hundred and sixty students of English and Urdu medium schools with age range 8 – 9 years. The result of the study highlights the significance of medium of instruction and expanded verbal dialect contribution to learning how to read (p. 157).

Students with learning disabilities are not treated well by their teachers because of lack of awareness among teachers. Teachers' rejection towards students develops anxiety (Habib & Naz, 2015). Lack of awareness among teachers' creates mistreatment towards students that cause brilliant students ultimately drop out due to

academic and emotional pressures (Nowak, 2013). A study by Habib and Naz (2015) has shown the relationship between psychological disappointment and instructors' dismissal among dyslexic students. This study was attempted to find out the relationship between signs of Dyslexia (SD), cognitive failure, interpersonal relationship anxiety (IRA) and teacher's rejection (TR) in children with dyslexia. The sample size for the study was 140 students (70 girls and 70 boys) with the age range 7 – 14 years. Researchers in this study, used Teacher's Acceptance-Rejection Questionnaire, Cognitive Failure Questionnaire, and Interpersonal Relationship Anxiety Questionnaire for assessment. Results of this study revealed the significant positive relationship between IRA, cognitive failure, SD, TR, and SD.

In another study, which examined teachers' attitude towards learning disabilities in Karachi concluded the dire need of awareness in teachers (Shaina, et al., 2016). The research surveyed teachers to examine the knowledge, behavior and attitude of teachers towards dyslexia, ADHD and autism and assess their ability to assess learning disabilities. The sample for this research was primary teachers of Karachi. Shaina, et al. (2016) further concluded their results with teachers' knowledge about learning inabilities is low, that restricts their capacity to distinguish learning weaknesses among students (p. 103).

Lack of awareness about dyslexia, causes at-risk and dyslexic students to suffered for long. Among few of the studies in Pakistan, researchers have concluded dyslexia as myth in Pakistan. Fatima and co (2014) failed to screen out dyslexic students in their research performed in Lahore. In their study they have established results that "the achievement of learning is affected due to failure in education system and faulty learning strategies". Dyslexia remains a myth in Pakistan (p. 7).

With very little research in this area, Pakistan has a limited number of institutions or clinics who are providing information about dyslexia. Research has showed a wide number of special institutions, organizations and Government special departments worldwide that are providing information, screening tests to identify dyslexia among students. Along with all the support they are also providing resources to aid dyslexic students.

Following are some of the institutions that are working in Pakistan:

- READyslexics (Pvt) Ltd in Karachi
- Dyslexia CARE in Karachi
- Institute of Dyslexia Education & Attitudinal Studies (IDEAS) in Rawalpindi
- Avantage Peak Performance Club in Lahore

2.3. DIBELS Next screening test

Ninety percent of learning disabilities are not visible (Leedon, 2015). It is important to recognize students with learning disabilities so they may not be left behind in learning. Recent research has uncovered the significance of surveying the starting perusing reading skills of students with expectations of advancing reading skills' success in their expectations. The identification and intervention in young students is crucial step for early reading problems (Barr, 2009). The identification of 'at-risk' dyslexic student can be screened by teacher through simple freely available test at school.

The Dynamic Indicators of Basic Early Literacy Skills (DIBELS) are an arrangement of methodology and measures for evaluating the securing of early proficiency abilities from kindergarten to 6th grade (Roland & Ruth, 2014). The questions intended to be short (one moment) used to screen the improvement of early education and early examining aptitudes. The score for every question mirrors the quantity of right reactions.

DIBELS' basic role is to give information to

- Recognizing reading skills "at-risk" of perusing disappointment
- Assessing the adequacy of intercession endeavors for those students (Good & Kaminski, 2002).

DIBELS can be viewed as dynamic since they permit test clients to screen changes in understudy execution after some time (Good & Kaminski, 1996). Additionally, as dynamic measures, DIBELS measures are touchy to contrasts among and changes inside people (Shinn & Bamonto, 1998). The DIBELS measures were made to give

15

data with respect to student advancement in the "enormous thoughts" of starting scanning (Good, Gruba, & Kaminski, 2002):

- Phonological and phonemic mindfulness
- Alphabetic comprehension
- Precision and familiarity with perusing new words and associated content

Following are some of the areas DIBELS Next follow to screen at-risk dyslexic students:

- *Initial Sound Familiarity (ISF)* measures student capacity to perceive and create the underlying sound (or "onset") in a progression of words.

- *Letter Naming Familiarity (LNF)* is a measure of student letter acknowledgment abilities.

- *Phoneme Division Familiarity (PSF)* surveys student capacity to section phonetically general words with three or four phonemes.

- *The Non Word Familiarity (NWF)* test measures student capacity to mix sounds to peruse new phonetically consistent words (i.e., phonological recoding aptitudes). Every test comprises of 50 arbitrarily orchestrated VC or CVC gibberish words. Understudies may read every word orally (e.g., "vit") or they can replicate every phoneme in segregation (e.g., "/v/, /i/, /t/").

- *DIBELS Oral Perusing Familiarity (DORF)* is a measure of student capacity to precisely and smoothly perused grade-level content.

DIBELS were produced in light of estimation methodology for Curriculum-Based Measurement (CBM), which were made by Deno and partners through the Establishment for Exploration and Learning Handicaps at the College of Minnesota in the 1970s-80s (e.g., Deno and Mirkin, 1977; Deno, 1985; Deno and Fuchs, 1987; Shinn, 1989). Like CBM, DIBELS were created to be sparing and proficient signs of

a students' advancement toward accomplishing a general result (Roland & Ruth, 2014).

Beginning exploration on DIBELS was appeared at the College of Oregon in the late 1980s. From that point forward, a progressing arrangement of studies on DIBELS has reported the dependability and legitimacy of the measures and their affectability to student change.

There has been broad exploration led on the DIBELS measures and how they precisely anticipate execution on critical results that rely on upon the capacity to examine and measure composed content (Howard, 2005). The examination sort incorporates execution of DIBELS in English learners and bilingual learners, usage in other dialect than English, acceptance of DIBELS test, check of results, and contrast in manual and modernized results, foundational work of DIBELS, individual estimation as phoneme division just, advance observing and assessing reaction to mediation and so forth.

DIBELS Next is general screening test for dyslexia as it comes in various dialects (Roland & Ruth, 2014). Satz and Fletcher (1979) said that "Genuine screening is quick and practicality and does not require capable comprehension." DIBELS for the most part take around 10 minutes or less to manage and are moderately ease. Organization is clear and does not require unique preparing. Numerous studies have been done in various nations to approve it and results have demonstrated the positive reactions.

There is a large volume of published studies describing the role of DIBELS Next. In 2001, Diane & Michelle published a paper in which they used DIBELS Next screening test to identify at-risk of dyslexia. In their study, they first screened students for at-risk of dyslexia later gave them treatment in an inclusive classroom setting. Their study participants were the students from the urban school with English as their second language. According to the researchers DIBELS Next was selected due to its analytical qualities. The measure of rapid letter naming and phoneme segmentation is particularly beneficial in identifying students at-risk for dyslexia for intervention commitments (Diane & Michelle P., 2001).

Thorough academic screening can be done professionally and effectively in the early elementary years (Elliott, Huai, & Roach, 2007). Elliot et. al (2007), discussed in publication about DIBELS Next's efficiency. They have concluded DIBELS Next as an effective freely available test for schools to identify at-risk for reading failure students. They recommend conducting screening studies prior to any kind intervention for aiding at-risk students (p. 157).

According to Diane & Karen (2013), screening test, to identify reading problem, helps to identify potential reading problems in young children before they turn into reading failure. DIBELS Next a screening test support researchers and teachers to identify at-risk students. Preventive measure or intervention should begin if dyslexia is assumed (Diane & Karen, 2013).

Several studies investigated DIBELS Next as language independent. One of the studies among Korean speaking English learners, Michael et. al (2014) found no significant difference in scores of students. They established a result that DIBELS Next can work exactly same on students with English language background and on students with other language backgrounds (p. 21).

According to Lockman (2015) in his study DIBELS Next benefits to screen at-risk dyslexic. He measures the relationship between the DIBELS ORF assessment and the Michigan Educational Assessment Program reading assessment. The findings of the study support the use of DIBELS as a screener to help educators in decision of selecting students in need of interventions (Lockman, 2015).

2.3. Multi-sensory instructional approach

Multisensory teaching links many brain areas and info with satisfactory accuracy and speed at same time (Prasannakumar, 2016). It means to teach in such a manner that it appeals to five senses. It involves the use of visual, auditory and kinesthetic pathways simultaneously to enhance memory and learning of written language (Richard & Rebecca, 2005). Its' direction suggests to visual, sound-related, and kinesthetic-material techniques utilized all the while to improve learning and memory (Campbell,

Helf, & Cooke, 2008). Multisensory learning includes visual, sound-related, and kinesthetic/material learning individualized to the requirements of every type of learner. Its' guideline empowers reading to be shown utilizing strategies steady with their own learning style. This permits learners to learn less demanding, hold, and speedier and apply these ideas all the more promptly to future learning. Multi-sensory teaching is effective for all learners (Majeda, 2013). It is not necessarily the case that educators ought to decide their students' individual learning qualities and instruct every student only in the way most appropriate to those properties. According to Ritchey & Geoke (2006), it is impractical to find everything that influences what student realizes in a class, and regardless of the possibility that instructor might, they be able to would not have the capacity to make sense of the ideal showing style for that student. In addition, regardless of the possibility that an instructor knew the ideal showing styles for all students of a class, it is difficult to actualize them at the same time in a class of more than two students (Ritchey & Goeke, 2006). Multisensory instructional approach works effectively and best in such condition.

Multisensory approaches have been observed to be viable in creating procedures to instruct various learners in the primary school setting (Nancy, 2016). Proficiency is critical in student accomplishment and results (Lewis, Madison-Harris, Muoneke, & Times, 2015). Multisensory based direction gives students a chance to create inspiration to learn, to work in an assortment of gatherings, and to show positive changes in students' demeanor towards learning (Filippatou & Kaldi, 2010). Multisensory exercises are connecting with and offer assortment to spelling guideline. Pleasing learning styles will permit students to reveal what they have realized in ways that mirror their individual qualities (Vaughn & Bos, 2009). According to Reid Lyon (2008) multisensory approach to reading with a scientific approach benefit to the struggling reader that deficit is lowered from 88% to 10%.

Some examples of multisensory activities are students tracing words pencils while articulating each sound, tracing the words with a finger, using magnetic letters, writing in sand, tapping out a word, writing on wiki sticks, or underlining the word while saying the word fast. These techniques might be especially useful for students who require special attention due to their difficulty in learning (Nancy, 2016).

2.4. Multi-sensory instructional approach to help dyslexia

Creative teaching methods using more than two senses can affectedly improve academic outcomes and language skills of students with at-risk of dyslexia (Birsh, 2005). According to Margaret Byrd Rawson (2005) Dyslexic students need a different approach to learning language from that employed in most classrooms. They need to be taught, slowly and thoroughly, the basic elements of their language—the sounds and the letters which represent them—and how to put these together and take them apart. They have to have lots of practice in having their writing hands, eyes, ears, and voices working together for conscious organization and retention of their learning.

There have been wide studies on multi-sensory instructional approach to aid at-risk dyslexic students. One of the study in Jordan by a researcher Majida Sayyed (2013), found significant impact of multisensory instructional approach on students with learning disability. Her research was to find out the difference among control and experimental groups. She concluded with the results that multi-sensory instructional approach benefits students with learning disabilities to achieve high learning (p. 81).

2.5. Inclusion

Students with disabilities should not be treated as special. According to Cecil and Elaine (2007), students with learning disabilities are as smart as everyone else (p. 1549). Their brains work differently which affects how they accept and process information (Gina, et.al, 2016 & Trépanier, 2013). They need a little more attention towards them. They feel and work like students with no disabilities in an inclusive classroom where they are not labeled but given an importance like everyone else. They feel respected in classroom; they behave normal in society just like students with no disability. Jeremy, (2013) concluded in his research that inclusive practices by teachers benefit students with learning disabilities (p. 13).

2.6. Inclusive classroom setting for dyslexic students

Research shows that 90% of children with dyslexia can be educated in regular inclusive classroom setting (Robbi, 2014). According to International Dyslexia Association (IDA), in inclusive classroom, multi-sensory instruction is an effective

approach to teaching children with dyslexia (Bailey E. , 2014). Marco & Luigina (2014) stated in their research that dyslexic students face difficulties in academia because their problems are hidden. They concluded in their result that multi-sensory instruction in an inclusive classroom where teacher use multiple approaches to deal with students with learning disability and with no disability; support in their learning (p. 364). In this study sample was the students - who supported this claim that they get better results in inclusive classroom setting than in general education class. They further showed positive attitude towards student-centered teaching approaches (p. 365).

3. Methodology

The primary purpose of this study is to identify students 'at-risk' for dyslexia and to aid them with multi-sensory instruction in an inclusive classroom setting. The study is a quasi-experimental because it is experimental yet very natural to the sample of the study. This study is deployed on one group of students therefore, *pre-experimental design: the one group pretest-post-test design* was employed.

3.1. Group Allocation

The purpose of the study is to check the effect of multi-sensory instruction for dyslexic student in an inclusive classroom setting; quasi experiment was conducted on students of grade 1 who were studying English. Studies have shown that early identification of students with age around seven years benefits to overcome the problem; no matter what quality of education they have received (Nicolson et. al, 2001; Paul, et. al, 2015 & Olga et. al, 2015). The students of primary school are chosen for the experimental group for conducting this study. Group had a mixture of both boys (60%) and girls (40 %).

3.2. Sampling

The selection of sample for this study is convenience based which has no difference than systematic sampling (Mohamad, et al., 2009). The sample size is 126 students of grade 1 in total. The students for this study are 6-8 year olds. The sample is a mix of boys and girls, with 75 boys and 51 girls.

3.3. Procedure

3.3.1. Identifying and defining the research problem

This study aims to identify at-risk dyslexic students among grade 1 students and to aid them with multi-sensory instruction in an inclusive classroom setting so as to enhance their learning of English as a second language. Given the benefit of multi-sensory instruction which includes text, audio, video, hands-on activities and group activities in English by previous researchers (Brish (2005) & Maajida Sayed (2013). This study

is deployed to investigate the effect of multi-sensory instruction in a Pakistani context. Thus, the following research question was formulated:

Research Question:
Does multisensory instructional approach help dyslexic students in effective learning of Grade 1 English?

3.3.2. Hypothesis formulation

To predict the result of the study, null and alternative hypothesis are formulated from derived research question. According to Andy (2009), the prediction which tells there is an effect present in the study is called as alternative hypothesis and denoted as H1. The other hypothesis which is opposite of alternative hypothesis says that there is no effect present in the study is called as null hypothesis and denoted as H0 (p. 27). For the research question of this study, following hypothesis are formulated:

H0: Multisensory instructional approach does not benefit dyslexic students in effective learning

H1: Multisensory instructional approach benefits dyslexic students in effective learning

3.3.3. Selecting relevant variables

To test hypothesis formulated in previous section, this study needed variables i.e. dependent and independent. Dependent variable is an effect of something whereas Independent variable is the cause of the effect (dependent variable). Identified variables from the research questions are as follows:

Dependent variable: Dyslexic students' learning of English (measured through Test scores)

Research question is to evaluate the learning of at-risk dyslexic student's learning of English. Therefore, dyslexic student's learning is effect which has to be checked in this study.

Independent Variable: Multi-sensory instruction

Research question is to evaluate the learning of at-risk dyslexic student's learning of English after giving them treatment of multi-sensory instruction. Therefore, multi-sensory instruction is cause of student's learning which has to be checked in this study.

3.3.4. Type of study

A Quasi-experiment; pre-experimental design: the one group pretest-post-test design was chosen for this study. The one group pretest-post-test can be defined as "A solitary case is seen at two time focuses, one preceding the treatment and one after the treatment. Changes in the result of interest are ventured to be the consequence of the mediation or treatment. No control or examination gathering is utilized (Campbell & Stanley, 2015, p. 8). For this experimental study one group of students are taken. They were tested before and after the treatment. Change in the result is gathered to analyze the effect of treatment i.e. multi-sensory instruction throughout the intervention time.

The one group pretest-post-test design can be represented as:

Experimental O1 X O2 (Louis et al, 2007)

Going through the representation, here O1 is the group of students who have been given the pre-test; X is the intervention of multi-sensory lectures and O2 is same group of students after the intervention given pre-test.

3.3.5. Selecting Levels to test dependent variable

The Independent variable (Multi-sensory instruction) is tested by using pre-test and post-test. Further it is measured through class test scores and observation checklist during the intervention. Pre-test and post-test are comprised of five questions to measure listening, speaking and reading of student. Class tests are taken at the end of the week after giving a week long multi-sensory complaint lectures. Observation checklist is used to observe each student during the intervention. Observation checklist is used to check the level of activity, attention (towards class and lectures),

effort, and relationship with teacher, relationship with peers and temperament of the student.

3.3.6 Conducting DIBELS Next test

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) Next is a set of procedure to measure the early literacy skills of the student. The basic role of DIBELS is to measure if a student is at-risk for dyslexia. For this study, DIBELS Next is used to identify at-risk students among 126 students. DIBELS Next comprises of some easy questions which take 4 – 5 minutes to complete the whole test. DIBELS Next is a freely available test; however permission from authors is already taken to be used for this study. Permission email can be found in Appendix A. DIBELS Next is easily taken from students and easily evaluated with a little practice and with the help of guide provided by authors.

3.3.7. Implementing the pre test

A pre-test assesses the level of participants at the start of the quasi experiment. It helps to measure previous learning. The pre-test is an arrangement of inquiries given to participants before the intervention starts so as to decide their insight level of the course content (Guidelines for pre-and-posttest, 2008).

In this case of the study, pre-test is taken from Pilar Barbosa Internship English Teacher Program, 2010. It helped to assess group of students' learning in English subject. This pre-test is prepared by the teachers of Barbosa and validated by the educators in internship program which is held yearly in Barbosa.

Pre-test used in this study can be found in the Appendix B.

3.3.8. Designing and implementing the lectures

Multi-sensory complaint lectures are prepared for this study, with the help of teachers and principal. This study is fifteen days long and had two weekly tests in the end of each week, which makes twelve days for multi-sensory complaint lectures.

Lectures are delivered by the English subject teachers in routine classes. Since it is an experimental study, it has been too natural. To keep the study natural everything -

class timings, subject teacher, and curriculum are especially taken care to remain same except the way of teaching i.e. pedagogy is changed to multi-sensory instruction.

For this study, eight units from *My English Book 1* are planned according to multi-sensory instruction. Those are as follows:

1. Animals and Birds
2. Fruits and Vegetables
3. Parts of Body
4. Vowels and Consonants
5. This – that and these – those
6. Numbers
7. Sounds 'sh' and 'ch'
8. Traffic lights

Lesson plans used in this study can be found in the Appendix C.

3.3.9. Designing and implementing class tests

Class tests are designed by the subject teacher with the help of researcher; topics are from units they learned in previous days of that particular week.

First week test is taken from following units:

- Animals and Birds
- Fruits and Vegetables
- Parts of Body

Second week test is taken from following units:

- Vowels and consonants
- This – that and these – those
- Numbers
- Sound 'sh' and 'ch'
- Traffic lights

3.3.10. Observing students through observation checklist

The observation checklist to observe at-risk students during class used in this study is by Tyler County Special Education Cooperative – Texas. It is a Texas institute which works for special education. It is freely available checklist and allowed to be used by anyone in any part of the world. The observation checklist concerns different academic areas, which are as follows:

- Oral Expression
- Listening comprehension
- Written expression
- Basic reading skills
- Reading fluency
- Reading comprehension
-

Observation checklist used in this study can be found in Appendix B.

3.3.11. Conducting post test

The post-test is intended to be fundamentally the same as the pre-test. The main contrast is that the grouping of the questions is revised a bit and the names and numbers are changed.

Post-test used in this study can be found in Appendix B.

3.3.12. Choosing suitable methods of analysis

Statistical analysis involves picking the fitting measurable test. Figure 1 shows how this is done.

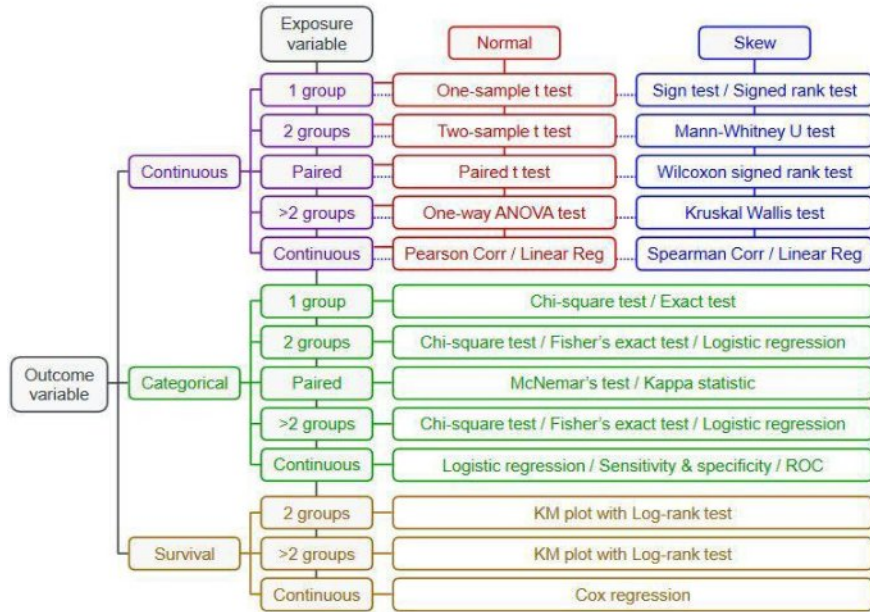Figure 2 (**Brian, 2013**)

For this study, the data is continuous. Students' learning in English (dependent data) is continuously measured with pre-test, class observations, weekly test and post-test. The data showed to be normalized after running the normality test in SPSS. Therefore, parametric tests are applied on the data. Results of parametric tests are in the following chapter i.e. chapter 04.

4. Data Analysis and Results

4.1. Overview

Many studies in different countries have shown positive result of multi-sensory instructional approach towards the learning of at-risk dyslexic students not only in English as first but as second language (Ho, 2001; Malatesha et. al, 2002; Vanessa et. al, 2014; Noemi et. al, 2014; Muhamad & Kuntoro, 2015). Literature has shown no such study to benefit at-risk dyslexic students in Pakistan. To experiment how effective multi-sensory instructional approach is for at-risk dyslexic Pakistani students, this experiment has arranged.

For this experimental study, required data was collected before, during and after the intervention phase of the designed experiment. Two types of data were collected i.e. qualitative data and quantitative data. The collected data was then tabulated and statistical tests were conducted. The results of collected data were used to analyze the results.

This chapter includes detailed description of collected data and how it was analyzed to get the results for performed experimental study.

4.2. Qualitative and Quantitative Data

To check the effectiveness of multi-sensory instruction for at-risk dyslexic learning, this experiment was settled. For this study, quasi experiment pre-experimental design: the one group pretest-post-test design was employed. The type of study helps to understand the differences in traditional and multi-sensory instruction for at-risk dyslexia Pakistani students' learning. Only one group was taken for this study that helped to check impact of multi-sensory instruction.

For this study, quantitative data was collected through Pre&Post-test. To strengthen the result quantitative data was triangulated with qualitative data which was collected through classroom observation and weekly tests. This triangulation of data validates the result of intervention.

Qualitative data is a non-numerical data and collected through observations, interviews, focus group and eye tracking test (Brian, 2013). Quantitative data is numerical data which is collected through questionnaires, Pre&Post-test and surveys (Brian, 2013). This experimental research collected data on three stages:

Pre-intervention: Quantitative data was collected in this stage through DIBELS Next and Pre-test.

During Intervention: Qualitative data was collected in this stage through classroom observation checklist which included level of activity, attention towards class, teacher, course content, relationship with teacher and peers, effort and motivation and temperament of student. Whereas the qualitative data required for this study, is collected through weekly tests.

Post-Intervention: Quantitative data was collected in this stage through Post-test.

4.3. Collected Data

4.3.1. DIBELS Next

DIBELS Next is a test to measure the basic learning skills of a student (Roland & Ruth, 2014).The set of questions in DIBELS Next help to identify students at-risk for dyslexia. DIBELS Next is a freely available online test. DIBELS Next test has some easy questions that take three to five minutes to complete. For this experimental study, we used the DIBELS test. A manual for assessing the score of DIBELS Next which explain every detail is provided by the authors (Roland & Ruth, 2011). DIBELS Next has been used worldwide to screen at-risk dyslexic student, is explained in literature chapter.

The results of DIBELS Next showed that among 126 students 51 were found at-risk for dyslexia. Among 51 at-risk students 34 were boys and 17 were girls. Table 1 shows the complete demographics of participants.

Table 1

	At-risk for dyslexia	Non-dyslexia	Total
Boys	34	41	75
Girls	17	34	51
Total	51	75	126

DIBELS Next score tells how much student need support in reading and writing. Authors have specified a benchmark with 113+ composite score of test which includes score of *Initial Sound Familiarity, Letter Naming Familiarity and Phoneme Division Familiarity*. Tests' cut points show how much a student is at-risk for dyslexia is following:

Table 2

Measure	Score Level	Likely need for support	Score
DIBELS composite	At or Above Benchmark	Likely to Need Core Support	113 +
	Below Benchmark	Likely to Need Strategic Support	97 - 112
	Below Benchmark	Likely to Need Intensive Support	0 – 96

Table 2 shows the cut point of benchmark

According to DIBELS Next assessment manual "If a student is at or above the benchmark goal on the DIBELS Composite Score, the odds are in the student's favor of reaching later important reading outcomes" (p. 24). Some students who score at or above the DIBELS Composite Score benchmark goal may still need additional support in one of the basic early literacy skills (Roland & Ruth, 2011).

Table 3

S. No.	Name	Grade	Age	DIBELS Next score
1	ALH	1	6	85
2	AQ	1	6	87
3	ALS	1	6	118
4	ASS	1	6	116
5	AHR	1	6	112
6	ADD	1	6	167
7	AMD	1	6	63
8	AHS	1	6	84
9	AKA	1	6	206
10	AH	1	6	242
11	AJ	1	8	167
12	AMZ	1	6	110
13	AR	1	6	156
14	ALR	1	6	161
15	AMJ	1	6	109
16	AMD	1	6	112
17	AM	1	6	165
18	AMN	1	6	96
19	AS	1	6	183
20	ANS	1	6	56
21	AN	1	7	131
22	ANS	1	6	159
23	AAA	1	6	176
24	AK	1	6	169
25	ASH	1	6	126
26	ASY	1	6	124
27	ATQ	1	6	35
28	AWS	1	6	111

29	AY	1	6	122
30	AZN	1	6	118
31	BBA	1	6	133
32	BA	1	6	136
33	BF	1	7	201
34	BTY	1	6	163
35	BR	1	6	141
36	DSH	1	6	137
37	DK	1	7	236
38	DSR	1	6	118
39	DZ	1	6	131
40	FAA	1	6	204
41	FRH	1	6	100
42	FH	1	6	112
43	FWA	1	6	120
44	FZ	1	6	180
45	FAS	1	6	222
46	GZA	1	6	134
47	GHH	1	6	95
48	GM	1	6	110
49	GJ	1	6	360
50	HMD	1	6	111
51	HMN	1	6	110
52	HSS	1	7	211
53	HRO	1	7	213
54	HSS	1	6	78
55	HB	1	6	65
56	HBD	1	6	51
57	IHM	1	6	211
58	IQ	1	6	53
59	JWD	1	6	167
60	JDA	1	6	36

61	JNZ	1	6	78
62	KS	1	6	157
63	KHH	1	6	145
64	KL	1	6	120
65	KZA	1	6	189
66	KM	1	6	89
67	LE	1	6	79
68	LSH	1	7	137
69	LRB	1	6	110
70	MD	1	8	3
71	MJ	1	7	193
72	MMN	1	6	112
73	MBB	1	6	164
74	MAZ	1	6	260
75	ML	1	6	77
76	MDS	1	6	187
77	MDA	1	6	117
78	MA	1	7	85
79	MDH	1	6	70
80	MDJ	1	6	172
81	MDS	1	7	102
82	MSS	1	6	8
83	MDL	1	6	59
84	MST	1	6	247
85	MML	1	6	145
86	NL	1	7	153
87	NJ	1	6	74
88	NJA	1	6	130
89	NSR	1	6	170
90	NZ	1	7	148
91	NB	1	6	120
92	NKK	1	6	134

93	PR	1	6	96
94	QS	1	6	49
95	QRR	1	6	70
96	QRZ	1	7	98
97	RB	1	6	65
98	RB	1	6	76
99	RM	1	6	146
100	RD	1	6	205
101	RFF	1	6	70
102	RZN	1	6	85
103	SB	1	6	185
104	SF	1	6	104
105	SH	1	6	96
106	SN	1	8	268
107	SNS	1	6	5
108	SRZ	1	6	120
109	SM	1	7	358
110	SG	1	7	81
111	SHY	1	6	208
112	SHK	1	6	129
113	SZ	1	7	152
114	SN	1	6	130
115	SY	1	6	202
116	SY	1	6	158
117	TB	1	6	128
118	THR	1	6	126
119	TL	1	6	181
120	UM	1	6	159
121	UW	1	6	134
122	YM	1	6	57
123	ZAB	1	6	232
124	ZB	1	6	137

125	ZR	1	6	208
126	ZY	1	7	340

Table 3 shows the complete list of participants, along their DIBELS Next scores, of this experimental study. According to assessment manual of DIBELS Next, provided by the authors, students' score has to match the benchmark to know if student is at-risk.

According to the scores in table 3, 51 students found at-risk for dyslexia that scored less than 113.

4.3.2. Pre-test

A Pre-test was conducted at the beginning of the study before introducing multi-sensory complaint lectures in the classrooms. Students took the test in the presence of their subject teacher; however teacher was not allowed to help any of the students at any stage of the pre-test.

Pre-test used in this study could be found in Appendix B.

Table 4

S. No.	Student name	Pre-test score out of 14
1	ALH	6
2	AQ	8
3	AHR	6
4	AMD	8
5	AHS	7
6	AMZ	8
7	AMJ	6
8	AMD	5
9	AM	5
10	AS	9
11	AWS	5
12	DK	9

13	FRH	9
14	FH	8
15	GHH	7
16	GM	6
17	HMD	10
18	HMN	7
19	HSS	6
20	HB	0
21	HBD	9
22	IQ	6
23	JA	7
24	JNZ	10
25	KM	4
26	LE	9
27	LSH	6
28	LRB	8
29	MD	5
30	MMN	8
31	MD	9
32	MDH	9
33	MJ	11
34	MDS	8
35	MSS	7
36	MDA	9
37	NJ	7
38	PR	5
39	QR	6
40	QRR	10
41	QRZ	9
42	RB	6
43	RBI	7
44	RFF	8

45	RZN	7
46	SF	7
47	SH	8
48	SNS	10
49	SG	3
50	SY	3
51	YM	8

All 126 participants took the pretest. Table 4 shows the pre-test scores of 51 at-risk participants only.

4.3.3. Observation checklist

In a condition when there are twenty four students in the classroom it is hard to use observation sheet checklist. Jablon (2009) suggests slowing down while observing and noting down in checklist. To avoid biasness in result teacher interacted with students, while researcher was present in whole time of intervention to observe them. To observe 51 students at a time is not possible, therefore few children were observed each day during intervention.

Therefore, following schedule for observations was made for the participants of this study:

This research was done in two schools having 24 students in five sections each. Four students were observed daily, for two weeks in each school, through observation checklist while a video of the students' interaction was recorded. Recording of video was for help to researcher to observe students some features of the event may be lost while written record. According to Maxwell (2001) videos allow features of the occasion to be characterized and recalled. Videos helped to fill in observation protocol for the rest of the children once the class is over. By looking into the videos, observation checklists were re-checked.

4.3.4. Weekly test

Participants of the study were given a test at the end of each week. Test was prepared by the researcher with the help of subject teacher. It included questions taken from

curriculum taught in the intervention phase. These weekly test were taken to measure the learning of student after giving a treatment of multi-sensory complaint lectures.

Table 5

S. No	Student Name	Week 1 – out of 10	Week 2 – out of 10
1	ALH	9	9
2	AQ	8	10
3	AHR	4	10
4	AMD	4	8
5	AHS	6	8
6	AMZ	7	9
7	AMJ	7	8
8	AMD	4	9
9	AM	9	9
10	AS	8	8
11	AWS	9	9
12	DK	8	10
13	FRH	6	9
14	FH	7	9
15	GHH	7	9
16	GM	7	10
17	HMD	5	10
18	HMN	5	8
19	HSS	5	8
20	HB	3	1
21	HBD	9	6
22	IQ	4	8
23	JA	6	10
24	JNZ	5	9
25	KM	3	8
26	LE	5	7
27	LSH	9	10
28	LRB	9	10

29	MD	2	2
30	MMN	6	9
31	MD	7	8
32	MDH	7	10
33	MJ	5	8
34	MDS	8	7
35	MSS	3	8
36	MDA	5	8
37	NJ	7	8
38	PR	4	4
39	QR	8	10
40	QRR	8	10
41	QRZ	7	9
42	RB	6	3
43	RBI	5	10
44	RFF	5	8
45	RZN	5	6
46	SF	6	9
47	SH	9	10
48	SNS	6	7
49	SG	6	4
50	SY	5	4
51	YM	0	2

Table 5 shows the results of fifty one at-risk students' weekly tests.

4.3.5. Post-test

Post-test was same test as pre-test but questions were re-ordered, as Dimiter and Phillip (2003) explains the designing of Pre&Post-test needs in that particular way (p. 160). The post-test intends to measure the effect on participants learning after getting the treatment In this study, understanding of concepts of at-risk students of grade 1 were measured with post-test after getting 15 day long multi-sensory instruction

complaint instruction. At-risk students were measured to check their learning in English after completing intervention phase.

S. No	Student Name	Post-test score out of 14
1	ALH	11
2	AQ	8
3	AHR	10
4	AMD	10
5	AHS	7
6	AMZ	10
7	AMJ	7
8	AMD	5
9	AM	6
10	AS	9
11	AWS	6
12	DK	11
13	FRH	11
14	FH	12
15	GHH	7
16	GM	8
17	HMD	12
18	HMN	9
19	HSS	7
20	HB	5
21	HBD	11
22	IQ	10
23	JA	10
24	JNZ	8
25	KM	8
26	LE	12
27	LSH	11
28	LRB	7

29	MD	5
30	MMN	10
31	MD	12
32	MDH	11
33	MJ	9
34	MDS	12
35	MSS	8
36	MDA	8
37	NJ	10
38	PR	10
39	QR	10
40	QRR	11
41	QRZ	9
42	RB	10
43	RBI	6
44	RFF	10
45	RZN	5
46	SF	10
47	SH	11
48	SNS	10
49	SG	5
50	SY	8
51	YM	10

Table 6 shows results of fifty one at-risk students' post-test.

4.4. Effect size

According to Robert (2002) effect size is a simple way of quantifying the difference between two groups that has many advantages over the use of tests of statistical significance alone. He further added that the impact size stresses the span of the distinction instead of puzzling this with test size (Robert, 2002). Coehn & co. states that effect size is the preferred statistics over statistical significance in meta-analyses (Louis, Lawrence, & Keith, 2007).). The effect size of this study is 0.88.

4.5. Choosing tests

4.5.1. Dependent vs Independent Sample

In educational research, sample is said to be dependent sample when group is paired to one another. And sample is said to be independent sample, when the measurements are made on two different groups' participants.

This experimental study comprised of one set of students. Data through pre-test, weekly test and post-test was collected through one group of students, therefore it is said to be a dependent sample study.

4.5.2. Parametric Vs Non-parametric

Cohen and co. (1988), explain test as follows: "Parametric tests are designed to make assumptions about the wider population and the characteristics of that wider population. Parametric tests assume:

- The data is normally distributed; the bell-shaped of the Gaussian curve of distribution seen
- There are continuous and equal intervals between the scores

Non-parametric tests assume no distribution of the population or the characteristics of the population. The results may not have bell-shaped curve of distribution (Louis, Lawrence, & Keith, 2007).
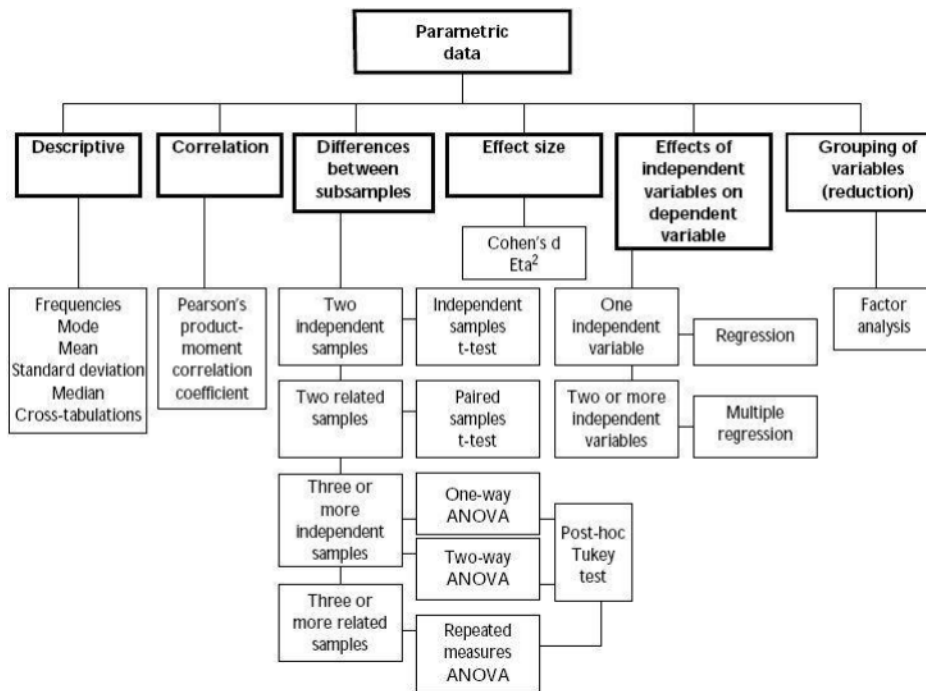
Figure 3 **Parametric Data**

Figure 3 explains when data is parametric which test to follow for statistical analysis
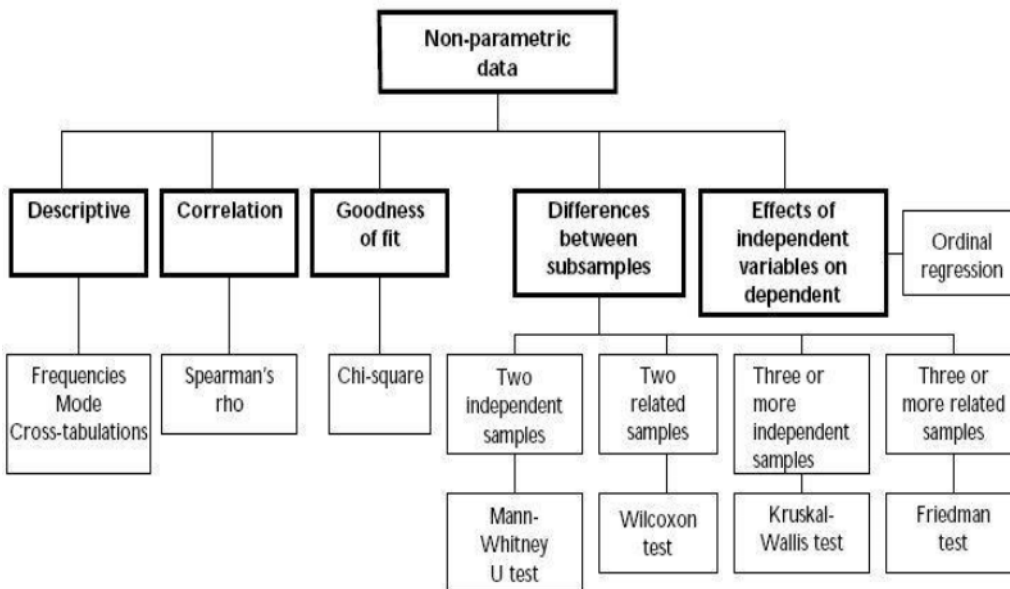

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Figure 4 Non Parametric data

Figure 4 explains when data is non-parametric which test to follow for statistical analysis.

4.5.3 Tests for Normality

Normality is the condition which means that data is normal. To check if the data collected is normally distributed, normality test in SPSS is used for this study. Normality curve is observed to check if data is normalized or normally distributed; along with curve histograms are also observed.

In SPSS, Shapiro Wilk test is used to measure the results for sample size ranging 0 – 2000. For this experimental study, sample size was 126. Therefore, normality check was measured with Shapiro Wilk test results. Shapiro Wilk tests that sample are in fact comes from a normal distribution.

Results of *Pre&Post-test, weekly tests* and *observation checklists'*, normality test with the histograms are shown in following figures:

4.5.3.1 Pre&Post-test:

As shown in the following table, Shapiro Wilk result for Pre-test was 0.41 and Post-test was 0.003 which are less than 0.5 that proves that data of Pre&Post-test is normal.

Tests of Normality

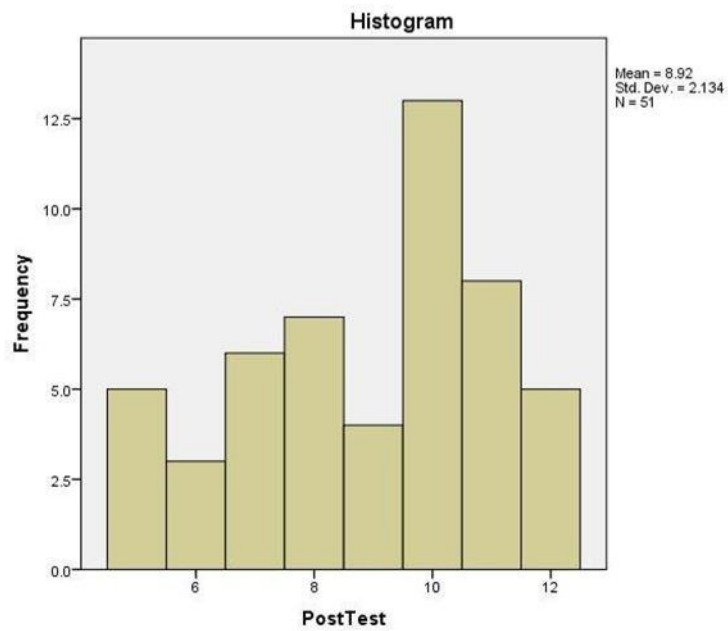|	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreTest	.129	51	.033	.953	51	.041
PostTest	.203	51	.000	.923	51	.003

a. Lilliefors Significance Correction

Following images of Pre&Post-test histogram show the *mean, standard deviation* and *number of sample size*.

PreTest

Histogram

Mean = 7.33
Std. Dev. = 2.197
N = 51

PostTest

Histogram

Mean = 8.92
Std. Dev. = 2.134
N = 51
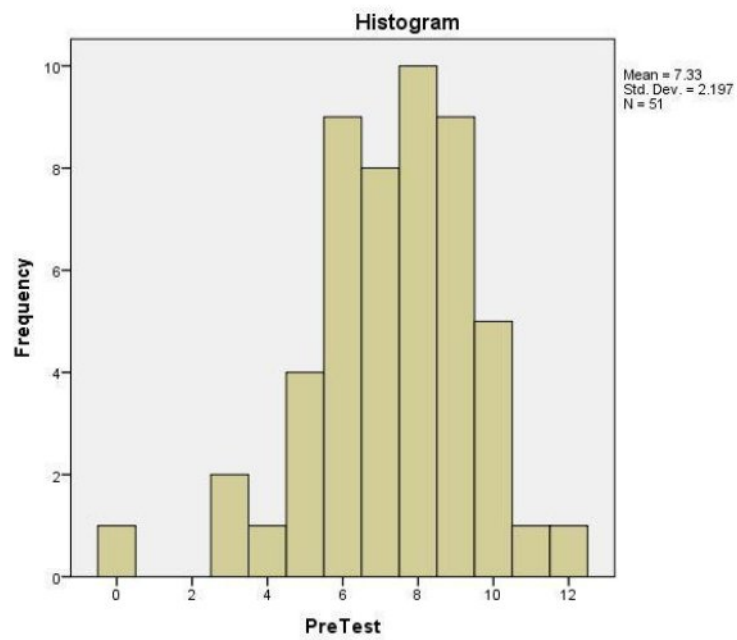
4.5.3.2 Weekly Test:

As shown in the following table, Shapiro Wilk result for Week 1 tests score is 0.32 and Post-test is 0.0001 which are less than 0.5 which proves that data of weekly tests is normal.
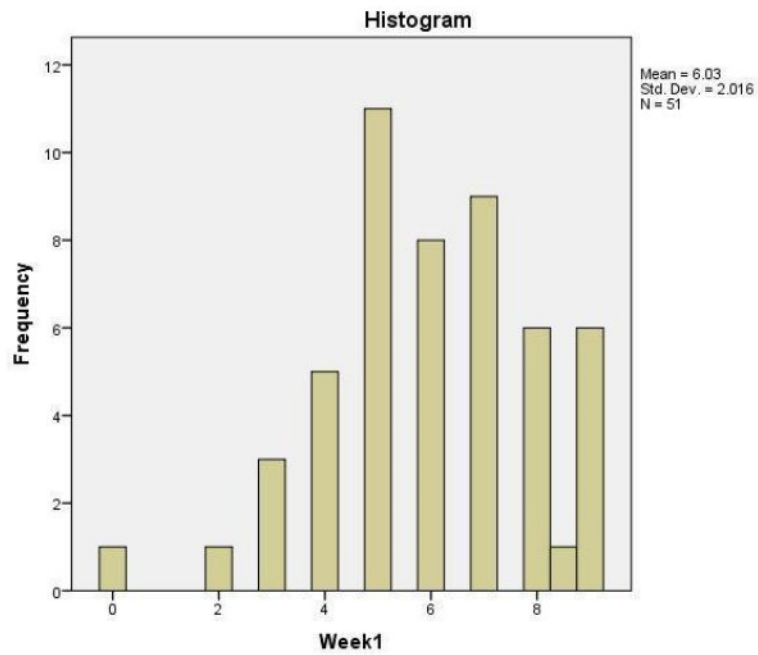
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[1] SPSS round the value to 0.000 which means it is near to 0.001
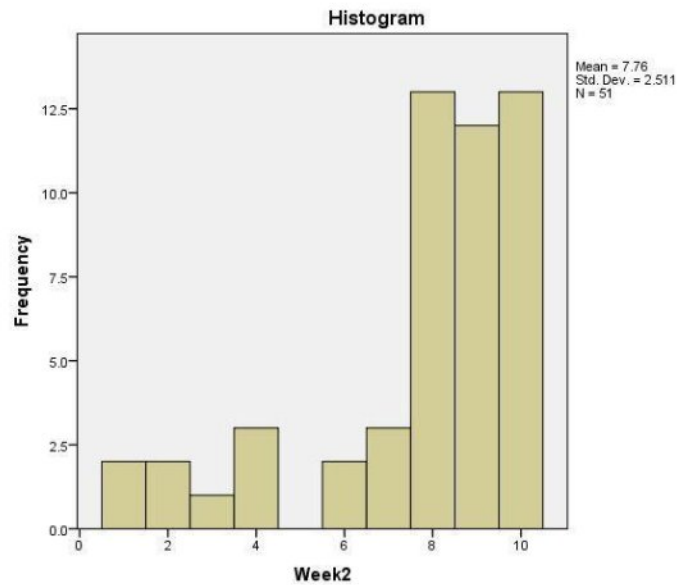
Tests of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Week1	.116	51	.082	.950	51	.032
Week2	.282	51	.000	.787	51	.000

a. Lilliefors Significance Correction

Week1

Histogram

Mean = 6.03
Std. Dev. = 2.016
N = 51

Week2

Histogram

Mean = 7.76
Std. Dev. = 2.511
N = 51

4.5.3.3 Observation checklist:

4.5.3.3.1. Attention:

As shown in the following table, Shapiro Wilk result for attention is 0.000 which is less than 0.5 that proves that data of attention is normal.

Tests of Normality[b,c,d,e,f,g]

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LI1	.344	51	.000	.637	51	.000
LI2	.344	51	.000	.637	51	.000
LI3	.415	51	.000	.605	51	.000
LI4	.354	51	.000	.636	51	.000
LI5	.405	51	.000	.613	51	.000
LI6	.395	51	.000	.620	51	.000
LI7	.364	51	.000	.633	51	.000
FD1	.540	51	.000	.196	51	.000
FD2	.530	51	.000	.340	51	.000
FD3	.425	51	.000	.595	51	.000
FD4	.535	51	.000	.299	51	.000
FD5	.435	51	.000	.584	51	.000
FD6	.385	51	.000	.625	51	.000
FD7	.344	51	.000	.637	51	.000
DFD1	.524	51	.000	.376	51	.000
DFD2	.524	51	.000	.376	51	.000
DFD3	.516	51	.000	.408	51	.000
DFD4	.539	51	.000	.252	51	.000
DFD5	.540	51	.000	.196	51	.000
ST2	.516	51	.000	.408	51	.000
ST3	.539	51	.000	.252	51	.000
ST4	.540	51	.000	.196	51	.000
ST5	.540	51	.000	.196	51	.000
ST6	.405	51	.000	.613	51	.000
ST7	.405	51	.000	.613	51	.000
ED1	.354	51	.000	.636	51	.000
ED2	.445	51	.000	.572	51	.000
ED3	.516	51	.000	.408	51	.000
ED4	.415	51	.000	.605	51	.000
ED5	.508	51	.000	.437	51	.000
ED6	.516	51	.000	.408	51	.000
ED7	.385	51	.000	.625	51	.000
BWP1	.535	51	.000	.299	51	.000
BWP2	.535	51	.000	.299	51	.000
BWP3	.536	51	.000	.124	51	.000
BWP4	.535	51	.000	.299	51	.000
BWP5	.536	51	.000	.124	51	.000
BWP6	.536	51	.000	.124	51	.000
BWP7	.508	51	.000	.437	51	.000
WI2	.536	51	.000	.124	51	.000
WI3	.536	51	.000	.124	51	.000
WI4	.524	51	.000	.376	51	.000
WI5	.540	51	.000	.196	51	.000
WI6	.508	51	.000	.437	51	.000
WI7	.492	51	.000	.486	51	.000
UC1	.540	51	.000	.196	51	.000
UC2	.454	51	.000	.558	51	.000
UC3	.364	51	.000	.633	51	.000
UC4	.464	51	.000	.543	51	.000
UC5	.374	51	.000	.630	51	.000
UC6	.364	51	.000	.633	51	.000
UC7	.385	51	.000	.625	51	.000
DUC1	.395	51	.000	.620	51	.000
DUC2	.539	51	.000	.252	51	.000
DUC3	.540	51	.000	.196	51	.000
DUC4	.454	51	.000	.558	51	.000
DUC5	.539	51	.000	.252	51	.000
DUC6	.530	51	.000	.340	51	.000
DUC7	.516	51	.000	.408	51	.000
AQ1	.539	51	.000	.252	51	.000
AQ2	.530	51	.000	.340	51	.000
AQ4	.536	51	.000	.124	51	.000
AQ6	.536	51	.000	.124	51	.000
AQ7	.536	51	.000	.124	51	.000

a. Lilliefors Significance Correction
b. DFD6 is constant. It has been omitted.
c. DFD7 is constant. It has been omitted.
d. ST1 is constant. It has been omitted.
e. WI1 is constant. It has been omitted.
f. AQ3 is constant. It has been omitted.
g. AQ5 is constant. It has been omitted.

4.4.3.3.2. Effort / Motivation:

As shown in the following table, Shapiro Wilk result for effort / motivation is 0.000 which is less than 0.5 that proves that data of effort / motivation is normal.

Tests of Normality[b,c,d,e]

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
TH1	.539	51	.000	.252	51	.000
TH2	.539	51	.000	.252	51	.000
TH3	.536	51	.000	.124	51	.000
TH4	.539	51	.000	.252	51	.000
TH5	.539	51	.000	.252	51	.000
TH6	.539	51	.000	.252	51	.000
TH7	.539	51	.000	.252	51	.000
GUE4	.540	51	.000	.196	51	.000
GUE5	.540	51	.000	.196	51	.000
GUE6	.540	51	.000	.196	51	.000
GUE7	.540	51	.000	.196	51	.000
CW1	.395	51	.000	.620	51	.000
CW2	.415	51	.000	.605	51	.000
CW3	.425	51	.000	.595	51	.000
CW4	.435	51	.000	.584	51	.000
CW5	.425	51	.000	.595	51	.000
CW6	.425	51	.000	.595	51	.000
CW7	.425	51	.000	.595	51	.000
ER1	.535	51	.000	.299	51	.000
ER2	.524	51	.000	.376	51	.000
ER3	.524	51	.000	.376	51	.000
ER4	.530	51	.000	.340	51	.000
ER5	.530	51	.000	.340	51	.000
ER6	.530	51	.000	.340	51	.000
ER7	.508	51	.000	.437	51	.000
HBW1	.454	51	.000	.558	51	.000
HBW2	.454	51	.000	.558	51	.000
HBW3	.473	51	.000	.526	51	.000
HBW4	.473	51	.000	.526	51	.000
HBW5	.464	51	.000	.543	51	.000
HBW6	.435	51	.000	.584	51	.000
HBW7	.464	51	.000	.543	51	.000
AIND1	.535	51	.000	.299	51	.000
AIND2	.535	51	.000	.299	51	.000
AIND3	.535	51	.000	.299	51	.000
AIND4	.535	51	.000	.299	51	.000
AIND5	.540	51	.000	.196	51	.000
AIND6	.535	51	.000	.299	51	.000
AIND7	.535	51	.000	.299	51	.000
WRP1	.536	51	.000	.124	51	.000
WRP2	.540	51	.000	.196	51	.000
WRP3	.530	51	.000	.340	51	.000
WRP4	.530	51	.000	.340	51	.000
WRP5	.435	51	.000	.584	51	.000
WRP6	.405	51	.000	.613	51	.000
WRP7	.374	51	.000	.630	51	.000
WS1	.385	51	.000	.625	51	.000
WS2	.385	51	.000	.625	51	.000
WS3	.354	51	.000	.636	51	.000
WS4	.364	51	.000	.633	51	.000
WS5	.425	51	.000	.595	51	.000
WS6	.405	51	.000	.613	51	.000
WS7	.435	51	.000	.584	51	.000
HSH1	.536	51	.000	.124	51	.000
HSH2	.536	51	.000	.124	51	.000
HSH3	.536	51	.000	.124	51	.000
HSH4	.536	51	.000	.124	51	.000
HSH5	.516	51	.000	.408	51	.000
HSH6	.540	51	.000	.196	51	.000
HSH7	.535	51	.000	.299	51	.000
LSH1	.535	51	.000	.299	51	.000
LSH3	.536	51	.000	.124	51	.000
LSH4	.536	51	.000	.124	51	.000
LSH5	.540	51	.000	.196	51	.000
LSH6	.540	51	.000	.196	51	.000
LSH7	.540	51	.000	.196	51	.000

a. Lilliefors Significance Correction
b. GUE1 is constant. It has been omitted.
c. GUE2 is constant. It has been omitted.
d. GUE3 is constant. It has been omitted.
e. LSH2 is constant. It has been omitted.

4.5.3.3.2. Relationship with Teacher:

As shown in the following table, Shapiro Wilk result for relationship with teacher is 0.000 which is less than 0.5 that proves that data of relationship with teacher is normal.

Tests of Normality[b,c,d]

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CO1	.536	50	.000	.125	50	.000
CO2	.536	50	.000	.125	50	.000
CO3	.539	50	.000	.255	50	.000
CO4	.401	50	.000	.616	50	.000
CO5	.535	50	.000	.303	50	.000
CO6	.523	50	.000	.380	50	.000
CO7	.523	50	.000	.380	50	.000
WD1	.536	50	.000	.125	50	.000
WD2	.536	50	.000	.125	50	.000
WD3	.536	50	.000	.125	50	.000
WD4	.536	50	.000	.125	50	.000
SA1	.339	50	.000	.637	50	.000
SA2	.339	50	.000	.637	50	.000
SA3	.360	50	.000	.634	50	.000
SA4	.391	50	.000	.622	50	.000
SA5	.380	50	.000	.627	50	.000
SA6	.380	50	.000	.627	50	.000
SA7	.380	50	.000	.627	50	.000
NIA1	.360	50	.000	.634	50	.000
NIA2	.349	50	.000	.636	50	.000
NIA3	.370	50	.000	.632	50	.000
NIA4	.471	50	.000	.530	50	.000
NIA5	.442	50	.000	.576	50	.000
NIA6	.461	50	.000	.547	50	.000
NIA7	.461	50	.000	.547	50	.000
RFA	.540	50	.000	.198	50	.000
RFA2	.540	50	.000	.198	50	.000
RFA3	.540	50	.000	.198	50	.000
RFA4	.540	50	.000	.198	50	.000
RFA5	.539	50	.000	.255	50	.000
RFA6	.539	50	.000	.255	50	.000
RFA7	.539	50	.000	.255	50	.000

a. Lilliefors Significance Correction

b. WD5 is constant. It has been omitted.

c. WD6 is constant. It has been omitted.

d. WD7 is constant. It has been omitted.

4.5.3.3.2. Relationship with peer:

As shown in the following table, Shapiro Wilk result for relationship with peer is 0.000 which is less than 0.5 that proves that data of relationship with peer is normal.

Tests of Normality[b]

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
WPA1	.374	51	.000	.630	51	.000
WPA2	.374	51	.000	.630	51	.000
WPA3	.374	51	.000	.630	51	.000
WPA4	.454	51	.000	.558	51	.000
WPA5	.395	51	.000	.620	51	.000
WPA6	.425	51	.000	.595	51	.000
WPA7	.425	51	.000	.595	51	.000
PGA1	.516	51	.000	.408	51	.000
PGA2	.516	51	.000	.408	51	.000
PGA3	.516	51	.000	.408	51	.000
PGA4	.539	51	.000	.252	51	.000
PGA5	.405	51	.000	.613	51	.000
PGA6	.405	51	.000	.613	51	.000
PGA7	.405	51	.000	.613	51	.000
IWO2	.536	51	.000	.124	51	.000
IWO3	.539	51	.000	.252	51	.000
IWO4	.425	51	.000	.595	51	.000
IWO5	.530	51	.000	.340	51	.000
IWO6	.530	51	.000	.340	51	.000
IWO7	.530	51	.000	.340	51	.000
HDP1	.425	51	.000	.595	51	.000
HDP2	.425	51	.000	.595	51	.000
HDP3	.425	51	.000	.595	51	.000
HDP4	.492	51	.000	.486	51	.000
HDP5	.473	51	.000	.526	51	.000
HDP6	.473	51	.000	.526	51	.000
HDP7	.473	51	.000	.526	51	.000
ISI1	.535	51	.000	.299	51	.000
ISI2	.540	51	.000	.196	51	.000
ISI3	.539	51	.000	.252	51	.000
ISI4	.508	51	.000	.437	51	.000
ISI5	.492	51	.000	.486	51	.000
ISI6	.464	51	.000	.543	51	.000
ISI7	.464	51	.000	.543	51	.000
WOI1	.364	51	.000	.633	51	.000
WOI2	.374	51	.000	.630	51	.000
WOI3	.385	51	.000	.625	51	.000
WOI4	.435	51	.000	.584	51	.000
WOI5	.415	51	.000	.605	51	.000
WOI6	.445	51	.000	.572	51	.000
WOI7	.415	51	.000	.605	51	.000
AVI1	.483	51	.000	.507	51	.000
AVI2	.464	51	.000	.543	51	.000
AVI3	.483	51	.000	.507	51	.000
AVI4	.492	51	.000	.486	51	.000
AVI5	.492	51	.000	.486	51	.000
AVI6	.483	51	.000	.507	51	.000
AVI7	.464	51	.000	.543	51	.000
NO1	.540	51	.000	.196	51	.000
NO2	.530	51	.000	.340	51	.000
NO3	.540	51	.000	.196	51	.000
NO4	.536	51	.000	.124	51	.000
NO5	.540	51	.000	.196	51	.000
NO6	.530	51	.000	.340	51	.000
NO7	.540	51	.000	.196	51	.000

a. Lilliefors Significance Correction

b. IWO1 is constant. It has been omitted.

4.5.3.3.2. Temperament:

As shown in the following table, Shapiro Wilk result for temperament is 0.000 which is less than 0.5 that proves that data of temperament is normal.

Tests of Normality[b,c,d]

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
HPP1	.540	51	.000	.196	51	.000
HPP2	.539	51	.000	.252	51	.000
HPP3	.415	51	.000	.605	51	.000
HPP4	.425	51	.000	.595	51	.000
HPP5	.374	51	.000	.630	51	.000
HPP6	.354	51	.000	.636	51	.000
HPP7	.354	51	.000	.636	51	.000
DEP1	.524	51	.000	.376	51	.000
DEP2	.524	51	.000	.376	51	.000
DEP3	.524	51	.000	.376	51	.000
DEP4	.516	51	.000	.408	51	.000
DEP5	.539	51	.000	.252	51	.000
DEP6	.539	51	.000	.252	51	.000
DEP7	.539	51	.000	.252	51	.000
ANG1	.535	51	.000	.299	51	.000
ANG2	.535	51	.000	.299	51	.000
ANG3	.539	51	.000	.252	51	.000
ANG4	.539	51	.000	.252	51	.000
DDR1	.473	51	.000	.526	51	.000
DDR2	.473	51	.000	.526	51	.000
DDR3	.483	51	.000	.507	51	.000
DDR4	.454	51	.000	.558	51	.000
DDR5	.454	51	.000	.558	51	.000
DDR6	.473	51	.000	.526	51	.000
DDR7	.473	51	.000	.526	51	.000
CON1	.425	51	.000	.595	51	.000
CON2	.425	51	.000	.595	51	.000
CON3	.395	51	.000	.620	51	.000
CON4	.405	51	.000	.613	51	.000
CON5	.405	51	.000	.613	51	.000
CON6	.435	51	.000	.584	51	.000
CON7	.435	51	.000	.584	51	.000
EU1	.435	51	.000	.584	51	.000
EU2	.454	51	.000	.558	51	.000
EU3	.500	51	.000	.463	51	.000
EU4	.464	51	.000	.543	51	.000
EU5	.464	51	.000	.543	51	.000
EU6	.508	51	.000	.437	51	.000
EU7	.508	51	.000	.437	51	.000

a. Lilliefors Significance Correction
b. ANG5 is constant. It has been omitted.
c. ANG6 is constant. It has been omitted.
d. ANG7 is constant. It has been omitted.

4.5.3.1. Definition

A paired-samples t-test is utilized when there is only one group of participants and data is collected from them on two distinct occasions or in continuous measure (Pallant, 2011).

4.5.3.2. Output of paired-sample T-test

4.5.3.2.1. Pre&Post-test:

To check the difference in Pre-test and Post-test scores, probability (p value) is checked. In SPSS, 'sig' means p value. In the following table that is output of paired-sample t-test, sig value is 0.000. This means that the probability is less than 0.0005 which is smaller than the specified alpha value of 0.05. Therefore, it is concluded that there is a significant difference in pre-test and post-test scores.

Paired Samples Test

| | | Paired Differences | | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) |
					Lower	Upper			
Pair 1	PreTest - PostTest	1.588	1.802	.252	2.095	1.081	-6.294	50	.000

The effect size of data can be calculated by Cohen's formula:

D = Mean / SD

Here mean is 1.588 and std. deviation is 1.802

D = 1.588 / 1.802

D = 0.88

Result of 'd' concludes that there is high effect size between pre-test and post-test.

To measure which set of score has higher value, we check mean of pre-test and post-test from the following paired samples statistics table. Following table shows mean of pre-test is 7.33 and post-test is 8.92, which shows that there is 21.6% increase. Results conclude that there is a significant increase in post-test scores (after the intervention) from pre-test scores (before the intervention).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PreTest	7.33	51	2.197	.308
	PostTest	8.92	51	2.134	.299

4.5.4. One-way ANOVA repeated measure

4.5.4.1. Definition

A one-way ANOVA repeated measure test is utilized when each participant of the study is exposed and measured on two or more different conditions (Pallant, 2011).

4.5.4.2. Output of one-way ANOVA repeated measure

4.5.4.2.1. Weekly tests:

A one-way ANOVA repeated measure tests multivariate tests from which we look for Wilk's Lambda. Pallant (2011) states that 'the multivariate tests produce same results but the most common informed is Wilk's Lambda'. Following multivariate tests results show that Wilk's Lambda is 0.65 with a probability value (significance) is 0.000 which means that $p < 0.0005$. The p value is less than 0.05; this concludes that there is a statistically significant effect in weekly tests.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.395	32.581[a]	1.000	50.000	.000	.395
Wilks' lambda	.605	32.581[a]	1.000	50.000	.000	.395
Hotelling's trace	.652	32.581[a]	1.000	50.000	.000	.395
Roy's largest root	.652	32.581[a]	1.000	50.000	.000	.395

Each F tests the multivariate effect of MultiSensory. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Although result in above table shows that there is a significant difference between the scores in weekly tests, we needed to check the effect size of this result. The Partial

Eta Squared value in the Multivariate tests' output shows the effect size of the data. Coehn's (1988) guideline for effect size says:

Small effect = 0.01

Moderate effect = 0.06

Large effect = 0.09

Value in this experimental study is 0.395. Following Coehn's guidelines it is concluded that it has *moderate effect*.

Statistically significant result suggests that there is difference somewhere among tests. This information, in SPSS, is provided in pairwise comparison table. Pairwise comparison table shows the output by comparing pairs and specify the difference between them. Following table shows each week test' difference is significant.

Pairwise Comparisons

Measure: MEASURE_1

(I) MultiSensory	(J) MultiSensory	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-1.735[*]	.304	.000	-2.346	-1.125
2	1	1.735[*]	.304	.000	1.125	2.346

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

4.5.4.2.2. Observation Checklist

4.5.4.2.2.1. Attention

Following multivariate tests results show that Wilk's Lambda is 0.004 with a probability value (significance) is 0.000 which means that $p < 0.0005$. The p value is less than 0.05; this concludes that there is a statistically significant effect in attention.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.996	42.557[a]	43.000	8.000	.000	.996
Wilks' lambda	.004	42.557[a]	43.000	8.000	.000	.996
Hotelling's trace	228.741	42.557[a]	43.000	8.000	.000	.996
Roy's largest root	228.741	42.557[a]	43.000	8.000	.000	.996

Each F tests the multivariate effect of Attention. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

The Partial Eta Squared value in the Multivariate tests' output shows the effect size of the data. The value of Partial Eta Squared is 0.996 and this concluded that it has large effect. Attention of students during intervention phase has improved from day one to last day after getting the treatment of multi-sensory complaint instruction.

4.5.4.2.2.2. Relationship with Teacher

Following multivariate tests results show that Wilk's Lambda is 0.26 with a probability value (significance) is 0.000 which means that p < 0.0005. The p value is less than 0.05; this concludes that there is a statistically significant effect in at-risk students' relationship with teacher.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.974	66.767a	18.000	32.000	.000	.974
Wilks' lambda	.026	66.767a	18.000	32.000	.000	.974
Hotelling's trace	37.556	66.767a	18.000	32.000	.000	.974
Roy's largest root	37.556	66.767a	18.000	32.000	.000	.974

Each F tests the multivariate effect of Relationship. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

The Partial Eta Squared value in the Multivariate tests' output shows the effect size of the data. The value of Partial Eta Squared is 0.974 and this concluded that it has large effect. Relationship of at-risk student with teacher during intervention phase has improved from day one to last day after getting the treatment of multi-sensory complaint instruction.

4.5.4.2.2.3. Effort/Motivation

Following multivariate tests results show that Wilk's Lambda is 0.005 with a probability value (significance) is 0.000 which means that p < 0.0005. The p value is

less than 0.05; this concludes that there is a statistically significant effect in effort or motivation of at-risk Pakistani students.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.995	126.396 a	31.000	20.000	.000	.995
Wilks' lambda	.005	126.396 a	31.000	20.000	.000	.995
Hotelling's trace	195.915	126.396 a	31.000	20.000	.000	.995
Roy's largest root	195.915	126.396 a	31.000	20.000	.000	.995

Each F tests the multivariate effect of Effort. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

The Partial Eta Squared value in the Multivariate tests' output shows the effect size of the data. The value of Partial Eta Squared is 0.995 and this concluded that it has large effect. Effort or motivation of students during intervention phase has improved from day one to last day after getting the treatment of multi-sensory complaint instruction.

4.5.4.2.2.4. Relationship with peer

Following multivariate tests results show that Wilk's Lambda is 0.053 with a probability value (significance) is 0.000 which means that $p < 0.0005$. The p value is less than 0.05; this concludes that there is a statistically significant effect in at-risk students' relationship with peer.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.947	13.589a	29.000	22.000	.000	.947
Wilks' lambda	.053	13.589a	29.000	22.000	.000	.947
Hotelling's trace	17.913	13.589a	29.000	22.000	.000	.947
Roy's largest root	17.913	13.589a	29.000	22.000	.000	.947

Each F tests the multivariate effect of Peer. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

The Partial Eta Squared value in the Multivariate tests' output shows the effect size of the data. The value of Partial Eta Squared is 0.947 and this concluded that it has *large effect*. At-risk students' relationship with peer during intervention phase has improved from day one to last day after getting the treatment of multi-sensory complaint instruction.

4.5.4.2.2.5. Temperament

Following multivariate tests results show that Wilk's Lambda is 0.59 with a probability value (significance) is 0.000 which means that $p < 0.0005$. The p value is less than 0.05; this concludes that there is a statistically significant effect in temperament of at-risk students.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.941	15.456a	26.000	25.000	.000	.941
Wilks' lambda	.059	15.456a	26.000	25.000	.000	.941
Hotelling's trace	16.074	15.456a	26.000	25.000	.000	.941
Roy's largest root	16.074	15.456a	26.000	25.000	.000	.941

Each F tests the multivariate effect of temperament. These tests are based on the linearly independent pairwise comparisons

The Partial Eta Squared value in the Multivariate tests' output shows the effect size of the data. The value of Partial Eta Squared is 0.941 and this concluded that it has large effect. Temperament of at-risk students' during intervention phase has improved from day one to last day after getting the treatment of multi-sensory complaint instruction.

4.6. Experimental group improvement in scores

Results of Pre&Post-test show the mean score difference from 7.33 to 8.92. This was increase in *21.6% increase*. Effect size for Pre&Post-test was 0.88. Weekly test show moderate effect of multi-sensory complaint instruction to at-risk students during intervention phase. And observation checklist show large effect size in data.

Therefore, the effect of multi-sensory complaint instruction to at-risk students resulted in a large effect size.

5. Discussion

5.1 Findings of the study

The result of DIBELS Next test showed that 40% of the students among the sample population were at-risk for dyslexia which is an alarming situation. The high percentage showed the need of awareness of learning disabilities among the schools and parents.

A Pre-test at the beginning of the study concluded a mean of 7.33 which indicates that 51 at-risk dyslexic students need an action which benefits them in their effective learning. As the test was designed to evaluate the learning of at-risk dyslexic students, the poor results show that there is a need of different pedagogy which aids them to learn in their style of learning. In a nutshell, treatment or pedagogy which is needed by at-risk students for their learning was missing.

The consequent increase in the mean scores of the post-tests to 8.92 was a positive sign. Between the pre-test and post-tests, a 15 day long multi-sensory complaint lectures were given to at-risk dyslexic students along with no-risk students in an inclusive classroom setting. During this period, the blackboard was used by the instructor to write and draw when needed along with videos, pictures and hands-on activities.

The inclusive setting let students with no-risk of dyslexia to support at-risk dyslexic students during complete period of intervention. During group and hands-on activities there was a higher chance of interaction between both types of students. This close interaction makes a bridge between at-risk dyslexic student and their effective learning. This indicates the benefits of inclusion.

The content material covered in the 15 day long intervention was from their curriculum. The difference was in the way the lecture was presented. This simultaneous display of information through all five senses gave a holistic view of the concept being taught. Moreover, the hands-on activities and real life display enabled

the students to make spontaneous and meaningful connections of concepts. Thus, developing their abstract understanding and increasing their learning.

At the end of the intervention, open-ended questions were taken from teachers. There were 4 teachers in total who participated in this study. All of them were interviewed individually. Interview questions can be found in Appendix D. Interview was then analyzed and showed a significantly positive result towards the multi-sensory instructional approach. Among four of the teachers, three showed a positive attitude towards multi-sensory instruction. One teacher was not seemed to be comfortable with it, though she participated by her own will. Result of the interview showed students did pretty well in their learning after getting multi-sensory instructional treatment.

5.2 Success Story

In this a 15 day long study, there is an exception of a student who performed very well. Student named as IQ, aged 6 years found at-risk for dyslexia in screening through DIBELS Next test. She also showed symptoms of being at-risk for dyslexia e.g. she writes mirror writing, shy, slow learner. She scored 6 out of 14 in Pre-test. She performed amazingly well during the intervention. Multi-sensory complaint lectures in an inclusive classroom setting helped her to learn English in effective way. She started learning things quickly when taught through videos and group discussions.

She showed a positive increase in change passing every day. She slowly gradually started doing better in class, which was observed through classroom observation checklist. She started asking questions when she did not understand any concept. She was a shy student who was not comfortable with her peers at the start of the study but then exhibited interaction towards them. She started participating in group activities.

With positive attitude towards teacher, peers and in classroom environment she also showed a positive response to her studies. She started taking parts in class activities along with she started answering to teachers' questions. She scored 4 out of 10 in first

week test while 8 out of 10 in second weekly test. This result shows a positive change in her learning. In the end of the study, she scored 10 out of 14 in Post-test.

5.3 Limitations

The results of this quasi-experimental research study support the use of multi-sensory instruction in an inclusive classroom setting to aid at-risk dyslexic students. However there are a few limitations of this study.

Firstly, due to time constraints, teachers get less time for multi-sensory instructions training. A more comprehensive study conducted in greater detail should include more time for training so that a stronger conclusion about the benefits of multi-sensory instruction can be made.

Secondly, resources for multi-sensory instruction were limited to few things. More resources may help students more in their effective learning.

6. Conclusion

"The capacity to learn is a gift, the ability to learn is a skill; the willingness to learn is a choice" Brian Herbert.

There are many unfortunate people who are not gifted to learn, they are suffering from invisible disability. Previous researches have indicated the necessities of awareness of learning disabilities especially dyslexia – problem in reading and writing. Many researches have shown the impact of multi-sensory instructional approach in an inclusive classroom setting on dyslexic students. This study was undertaken due to lack of research conducted in this field in Pakistan. This project was undertaken to bring awareness among parents and school administration about learning disabilities in general and dyslexia in particular. Furthermore the aim of the study was to identify the impact of multi-sensory instructional approach in an inclusive classroom setting for at-risk dyslexic students. Keeping in mind the limitations and adequacy of behavior approach, multi-sensory instructional approach was used to support students at-risk of dyslexia. Multi-sensory instruction consisted of text, pictures, videos, group discussion, and hands-on activities to help students at-risk of dyslexia along with students with no-risk of dyslexia.

The effect of multi-sensory instructional approach in an inclusive classroom setting on Pakistani students at-risk of dyslexia was observed. At-risk dyslexic students need little more attention than no-risk of dyslexia students. Multi-sensory instructions help to understand a simple task in multiple ways which aid at-risk dyslexic students to learn effectively. Inclusive classroom setting keeps self-esteem of every student. It assists every student to learn in their own way without labeling them as different.

Returning to the hypothesis posed in chapter three of this study, null hypothesis was: Multisensory instructional approach does not benefit dyslexic students in effective learning. Whereas the Alternative Hypothesis was formulated as: Multisensory instructional approach benefits dyslexic students in effective learning.

A Quasi-experiment; pre-experimental design: the one group pretest-post-test design was chosen to conduct this study. The sample size was 126 students of grade 1.

Among them 75 were boys and 51 were girls. In order to setup a fair environment inclusive classroom setting was deployed. Furthermore, the pre-test score was used at the start of the intervention to compare the effects of multi-sensory instructional approach, therefore suitable to be used in a quasi-experimental study.

Qualitative and Quantitative analysis was conducted on the data gathered throughout the study and significant difference was found. The data collected through pre-test and post-test showed a large effect size of 0.88. Furthermore, Paired sample T-test showed a significant difference between pre-test and post-test. The data from weekly tests showed a moderate effect of 0.395. A one-way ANOVA repeated measure test showed a significant difference between week 1 and week 2 tests. And data from observation checklist concluded effect size of 0.95. A one-way ANOVA repeated measure showed a significant difference between day one results to last day results on intervention i.e. multi-sensory complaint instruction to at-risk students.

After analyzing the data null hypothesis is rejected and alternate hypothesis is failed to reject. It is concluded that multi-sensory instructional approach in an inclusive classroom setting has a significant impact on at-risk Pakistani dyslexic students' effective learning.

There is a dire need of awareness among parents and school administration of learning disabilities and specifically dyslexia – a disability in reading and writing. Awareness makes them to identify students with at-risk of dyslexia at earliest and assists them in their effective learning. Furthermore, study result showed multi-sensory instructions in an inclusive classroom setting benefit students in their effective learning. It lets every student to learn at their own pace in their own learning style which gives a positive impact on their learning.

6.1 Future directions

An awareness of learning disabilities brought such significant result in this short period of study, may bring a lot more effect on students learning at longer duration. Awareness sessions by school administration for teachers and parents will be beneficial far way more to students with learning disability.

Multi-sensory instructional approach is a field that has a lot of room for improvements based on research. The more it is implemented in classrooms the more ideas comes to mind. On the basis of daily class results, multi-sensory instructions may get improved. These results may help teacher to improve lectures according to the needs of the students. More time for intervention may bring more positive change in result.

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Appendices

Appendix A

Permission email from DIBELS Next authors

Dynamic Measurement Group <info@dibels.org>   Apr 12
to mheckel, me, Manzil

Hi Mehdia,

As the authors of DIBELS, we hereby grant permission to use the free download version of DIBELS Next for the purpose of the study as described below.

Please let me know if you have any questions,

...
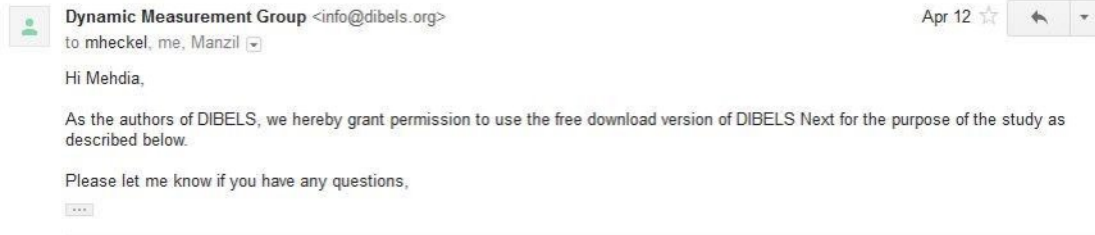
Appendix B

Pre-test

Name: _____   Date: _____

Listening and Speaking
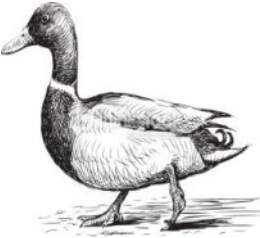
The student uses the English language to interpret input, construct meaning, interact with confidence both verbally and nonverbally, and express ideas effectively in a variety of personal, social and academic context.

L/S.1.2   Develops and demonstrates phonemic awareness and auditory discrimination to identify distinctive sounds.

   I.   Instructions:

          Listen to the teacher.   Circle the **BEGINNING** sound of the word you hear.

Example:

___uck	d	q	b

1.

___ite	t	k	g

2.

___ango	w	m	n

3.
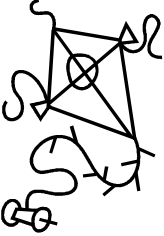
___ouse	m	r	s

II. Instructions: Listen to the teacher. Circle the **ENDING** sound of the word you hear.

1.

foo___	d	l	t

2.

cu___	m	p	c

3.

han___	d	b	t

L/S.1.3   Uses basic vocabulary and language patterns to identify and describe familiar
             concepts related to self, to family, and to interact with peers.

III.   Instructions:

Listen to the teacher. Look at the pictures. Circle the picture that **BEST** describes what the teacher is saying.

Example:

1.

2.

3.
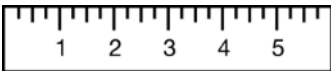
L/S.1.5   Uses both verbal and nonverbal forms of communication to express feelings, needs, experiences, and reacts to pictures and simple language cues after listening to read aloud.

IV.   Instructions:

The teacher will ask the student several questions about student's personal information to assess oral communication skills.

> 1. What is your name?
> 2. Where do you live?
> 3. What grade are you in?
> 4. How old are you?

Rubric for Assessing Listening and Speaking

RESPONSES CAN BE NON-VERBAL OR VERBAL IN ENGLISH. SPANISH RESPONSES ARE NOT CONSIDERED WHEN ASSIGNING A SCORE TO A SHORT-ANSWER ORAL PRODUCTION ITEM MEASURING.

SCORE	CRITERIA
2	Full Oral or Non-verbal Production – A thorough oral or non-verbal production of the concept has been

	demonstrated. The student's response is correct and complete and provides evidence related to the question/task. Details in the response are clear accurate.
1	Partial Oral or Non-verbal Productions – Partial oral or non-verbal production of the concept has been demonstrated. The student's response provides some information that is accurate. However, the response is not complete and may not provide clear evidence related to the questions/task.
0	No Oral or Non-verbal Production – The student's response demonstrates no oral or non-verbal production no understanding of the concept being assessed. The response is inaccurate or unrelated to the question/task.

Reading

The student uses reading strategies, literary analysis, and critical thinking skills to construct meaning and develop an understanding as well as an appreciation of a variety of genres of both fiction and nonfiction.

R.1.3   Uses context clues and illustrations to identify details and to determine the

meaning of unfamiliar words; demonstrates an acquisition of grade level

vocabulary.

I. **Instructions**. Read the word. Circle the picture that **BEST** describes the word.

1. bus

2. jumping

3. cup
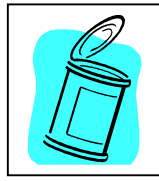
4. reading

5. cooking
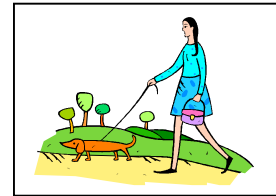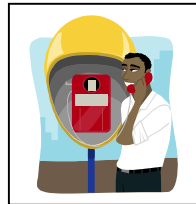
R.1.2 Uses phonemic awareness strategies to manipulate sounds to form new monosyllabic   words.

III. Instructions: Read the following story out loud to the teacher.

My dad has a cat.

The cat is fat.

My mom wants a dog.

I want to get them both.

RUBRIC FOR ASSESSING READING SKILLS.

	CRITERIA

SCORE	
2	Full Oral Production – A thorough oral production of the concept has been demonstrated. The student's response to reading is correct and complete and provides evidence related to the question/task. Details in the reading are clear and accurate.
1	Partial Oral Production – Partial oral production of the concept has been demonstrated. The student's response to reading provides some skills that is clear and accurate. However, the response is not complete and may not provide clear evidence related to the questions/task.
0	No Oral Production – The student's response demonstrates no oral production or understanding of the concept being assessed. The response is inaccurate or unrelated to the question/task.

Post-test

Name: _____   Date: _____

Listening and Speaking
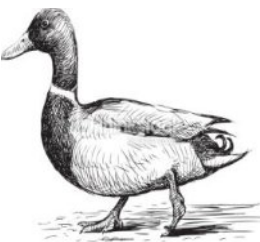
The student uses the English language to interpret input, construct meaning, interact with confidence both verbally and nonverbally, and express ideas effectively in a variety of personal, social and academic context.

L/S.1.2   Develops and demonstrates phonemic awareness and auditory discrimination to identify distinctive sounds.

II.   Instructions:

Listen to the teacher. Circle the **BEGINNING** sound of the word you hear.

Example:

___uck	d	q	b

1.

___ite	t	k	g

2.

___ango	w	m	n

3.

___ouse	m	r	s

II. **Instructions**: Listen to the teacher. Circle the **ENDING** sound of the word you hear.

1.

han___	d	b	t

2.

cu___	m	p	c

3.

 foo___	d	l	t

L/S.1.3   Uses basic vocabulary and language patterns to identify and describe familiar
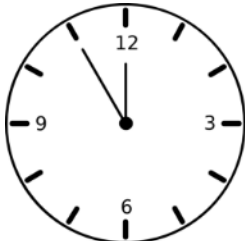   concepts related to self, to family, and to interact with peers.
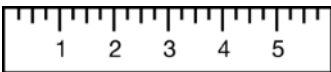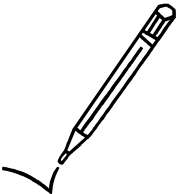
V.   Instructions:

        Listen to the teacher. Look at the pictures. Circle the picture that **BEST** describes what the teacher is saying.

Example:

1.

2.

3.

L/S.1.5   Uses both verbal and nonverbal forms of communication to express feelings, needs, experiences, and reacts to pictures and simple language cues after listening to read aloud.

VI.   Instructions:

The teacher will ask the student several questions about student's personal information to assess oral communication skills.

> 5.   What is your name?
>
> 6.   Where do you live?
>
> 7.   What grade are you in?
>
> 8.   How old are you?

Rubric for Assessing Listening and Speaking

RESPONSES CAN BE NON-VERBAL OR VERBAL IN ENGLISH. SPANISH RESPONSES ARE NOT CONSIDERED WHEN ASSIGNING A SCORE TO A SHORT-ANSWER ORAL PRODUCTION ITEM MEASURING.

SCORE	CRITERIA
2	Full Oral or Non-verbal Production – A thorough oral or

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The student uses reading strategies, literary analysis, and critical thinking skills to construct meaning and develop an understanding as well as an appreciation of a variety of genres of both fiction and nonfiction.
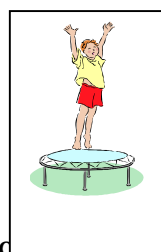
R.1.3   Uses context clues and illustrations to identify details and to determine the

meaning of unfamiliar words; demonstrates an acquisition of grade level

vocabulary.

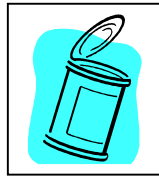I. **Instructions**. Read the word. Circle the picture that **BEST** describes the word.
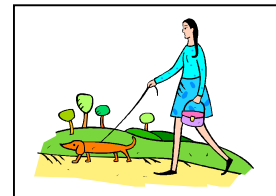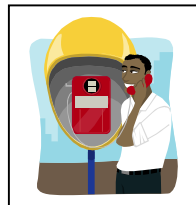
1. reading

2. jumping

3. bus

4. cup

5 . cooking

R.1.2 Uses phonemic awareness strategies to manipulate sounds to form new monosyllabic   words.

III. Instructions: Read the following story out loud to the teacher.

Classroom observation checklist

CLASSROOM OBSERVATION FORM

Student: _____ Grade: ___ Date:_____ Age: _____
Teacher: _____ Observer: _____ Campus: _____
Location of Observation: _____ Length of Observation: _____

Area(s) of academic concern:
☐ oral expression ☐ listening comprehension ☐ written expression ☐ basic reading skills
☐ reading fluency ☐ reading comprehension ☐ math calculations ☐ math problem solving

Check any that apply:
- **Level of activity**
  ___ hyperactive/fidgety/restless
  ___ appropriate
  ___ lethargic/tired

Attention
___ listens to instruction
___ follows directions
___ difficulty following directions
___ stays on task
___ easily distracted
___ begins work without prompting
___ works independently
___ understands concepts presented
___ does not understand concepts
___ asks questions

Relationship with teacher
___ cooperative
___ withdrawn
___ seeks attention
___ needs individual attention
___ refuses to follow instructions

Effort/motivation/preparation
___ tries hard
___ gives up easily
___ careless in work
___ eager to please/eager to respond
___ hesitant to begin working
___ apathetic/indifferent
___ works at reasonable pace
___ works slowly
___ had supplies on hand
___ lacked supplies for class

Relationship with peers
___ works/plays alone
___ participates in group activities
___ interacts well with others
___ hitting, poking, distracting peers
___ Initiates social Interaction
___ waits for others to initiate
___ avoids peer Interaction
___ not observed

Temperament
___ happy
___ depressed/withdrawn
___ angry/hostile
___ anxious
___ daydreams
___ confused
___ easily upset

Lesson(s) observed: _____
_____
_____

Instructional methods teacher used:
___ full class direct teaching
___ small group direct teaching
___ discussion (teacher/students)
___ visual/media
___ learning centers
___ independent work
___ hands-on activities
___ other: _____

Kinds of instructional resources used:
___ textbooks
___ workbooks
___ trade books
___ hands-on manipulatives
___ worksheet(s)
___ overhead

Notes:
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Appendix C

Lesson Plan

Day 01:

Topic	Animals and Birds – Unit 6.1 Six animals	
Reference	My English Book 1 Page number: 25	
Objective	After completing this lesson, student will be able to: • Recognize six animals (Monkey, Zebra, Lion, Bear, Elephant and Horse) • Read animal names	

Material	Video:
	  1. Short length video, titled "animal-sounds" Source "https://drive.google.com/drive/u/0/folders/0BwIl6riD m5rlZlRSTERmUzZrVjg"
	Images:
	  1. Monkey, Zebra, Lion, Bear, Elephant and Horse. Source: text book
	Flash Cards:
	  2. Monkey, Zebra, Lion, Bear, Elephant and Horse	

Procedure	Time Duration	Method
	5 minutes	• Students will be told about the animals they are going to learn in the lecture • This will make a connection of students with real world and lesson they are going to study about in lecture
	15 minutes	Multi-sensory activities: • Teacher will start reading animal names – auditory sense • Students will have tablets for short length videos – using visual sense • They are allowed to play videos for more than one time - using visual sense • Teacher will show them flash cards - through they will read-a-loud and try to memorize names with reading - using visual sense
	10 minutes	Group Activity: (Students will learn from each other. They will learn to help others when they are in need) • Role Playing: - Dialog based activity. ▪ Students will talk to each other asking about animals

		▪ They will ask each other who already knew which animal from six (they learnt in lesson) ▪ They will tell each other if they have seen any animal taught by teacher ▪ Each student will speak up an animal name each, what they have learnt in the class earlier - using auditory sense
	10 minutes	Revision: • Teacher will ask animals' names by showing pictures • Teacher will ask about animals by writing names on blackboard to check if they can read
Accommodat ions	• Materials used in lecture are the accommodations for both - dyslexic and non-dyslexic students. • These modifications in traditional lecture will aid dyslexic students. • This modification is an invisible aid.	

Day 04:

Topic	Fruits and Vegetables – Unit 6.1 Six fruits
Reference	My English Book 1 Page number: 27
Objective	After completing this lesson, student will be able to: • Recognize six fruits (Banana, Apple, Grapes, Guava, Mango and Water-melon) • Read fruits names
Material	Real fruits: 2. Banana, Apple, Grapes, and Mango Images: 3. Banana, Apple, Grapes, Guava, Mango and Water-melon. Source: text book Flash Cards: 4. Banana, Apple, Grapes, Guava, Mango and Water-melon

Procedure	Time Duration	Method
	5 minutes	• Students will be told about the fruits they are going to learn in the lecture • This will make a connection of students with real world and lesson they are going to study about in lecture
	15 minutes	Multi-sensory activities: • Teacher will start reading fruits names – auditory sense • Students will have fruits in real – using visual sense • Teacher will show them flash cards - through they will read-a-loud and try to memorize names with reading - using visual sense
	10 minutes	Group Activity: (Students will learn from each other. They will learn to help others when they are in need) • Role Playing: - Dialog based activity. ▪ Students will share about their experiences eating fruits ▪ They will ask each other who already knew which fruit from six (they learnt in lesson) ▪ Each student will speak up a fruit name each, what they have learnt in the class earlier - using auditory sense

	10 minutes	Revision: • Teacher will ask fruits names by showing real fruits and pictures • Teacher will ask about fruits by writing names on blackboard to check if they can read
Accommodations		• Materials used in lecture are the accommodations for both - dyslexic and non-dyslexic students. • These modifications in traditional lecture will aid dyslexic students. • This modification is an invisible aid.

Day 07:

Topic	Vowels and consonants – Unit 8.1, 8.2, 9.1 and 9.3 Seven parts of body	
Reference	My English Book 1 Page number: 32-34	
Objective	After completing this lesson, student will be able to: • Understand Vowel and consonants • Can differ between a and an	
Material	1. Sand tray 2. Flash Cards: • Vowels and consonants	
Procedure	Time Duration	Method
	5 minutes	• Teacher will ask about alphabets • Teacher will ask if they know what vowel and consonant is, by asking students will get to know what they are going to study in lecture
	15 minutes	Multi-sensory activities: • Teacher will start telling about vowels and consonants –auditory sense • Students will see and write vowels first on sand tray and salate– using visual and touch sense • Teacher will show them flash cards - through they will read-a-loud and try to memorize vowels with reading - using visual sense

	10 minutes	Group Activity: (Students will learn from each other. They will learn to help others when they are in need)
		• Role Playing: - Dialog based activity.
		    ▪ Students will tell parts of body to each other by touching them
		    ▪ They will ask each other who already knew which part of body name from seven (they learnt in lesson)
		    ▪ Each student will speak up part of body each, what they have learnt in the class earlier - using auditory sense

	10 minutes	Revision: • Teacher will ask parts of body by just showing without any sound • Teacher will ask about parts of body by writing names on blackboard to check if

		they can read
Accommodations		• Materials used in lecture are the accommodations for both - dyslexic and non-dyslexic students. • These modifications in traditional lecture will aid dyslexic students. • This modification is an invisible aid.

Appendix D

Interview Protocol

1. Name and Qualification

2. How long have you been teaching?

3. What specific multi-sensory instruction have you implemented in your classes?

4. What motivates you to participate in this program on campus?

5. How students reacted to new instructional approach?

6. What are some of the major challenges you faces in attempting to change teaching, learning, and assessment practices?

7. How do you think this type of instruction benefit your students?

8. Will you continue to use it in your classroom?

9. How can you make it