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Language problems in mathematics studies

Is there a link between difficulty solving mathematical verbal problems and reading deficiency among 7th graders?

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Abstract

The aim of this study was to find out whether or not there is a connection between an observed difficulty in solving verbal mathematical verbal problems and reading deficiency, specifically among 7th grade students in Israeli Arab schools.

This study is a combination of a preliminary test to identify students who have difficulty in solving verbal mathematical verbal problems and a follow-up qualitative study of the students identified as having such difficulties, based on personal interviews.

The preliminary test included ninety 7th grade students from three schools in northern Israel, 30 from each school. The participants were given easy leveled verbal mathematical verbal problems. The qualitative study had been performed with 10 out of the 32 students that failed the preliminary test (scored less than 60).

The main findings indicate a connection between students' reading ability and the ability to solve verbal mathematic problems. In the conducted preliminary test, some of those failing to solve verbal mathematical problems were found to have reading difficulties.

It was also found that compared to students with relative high academic achievements, most students with lower achievements, report low interest in learning and approach tests (in mathematics and other subjects), with low faith in their ability to succeed.

Keywords: verbal problems in Mathematics; reading deficiency; problems' solving pressure, mathematical solving complexity.

1. Introduction

Mathematics is one of the academic subjects that several students experience learning difficulties with, at an early stage of primary school. The results of the – National Assessment of Educational Progress (2013), indicates that less than 50% of the students tested each year, receive reasonable scores in Mathematics. Data gathered shows that 10% of 8th grade students and about 25% of 7th grade students tend to get a score below the level of basic knowledge. This data refers to all learning deficiencies and other factors affecting educational achievements. The current study was focused on one factor: to what extent reading deficiencies effects students' ability to solve verbal problems in mathematics.

"Solving verbal problems is a complex process requiring the students to combine cognitive and meta-cognitive processes to identify relevant information, determine what information is missing, and create an adequate representation of the problem, which leads to selection and execution of the appropriate solving strategies" (Nesher, 2020).

Collins (2018), identifies reading as one of the major skills required to solve verbal problems in mathematics, and observes that students who have reading deficiency, often experience difficulties in comprehending and solving such problems.

Mathematics teachers and educators at large are aware of the fact that students with reading difficulties have, among other challenges, difficulties in solving verbal problems in mathematics, however, effective teaching methods or interventions aimed to improve students' reading skills are yet to be designed, tested, approved and implemented. Most of the studies published in this field investigated the teachers' experience and their views on the matter, rather than that of the students who have difficulties to cope with such tasks. The qualitative study, comprising the second part of this study, was based on in-depth interviews with 10, out of 42 7th grade student of 3 different Arabic schools in Israel, who were identified in a previous test as having difficulties in solving verbal mathematical problems. The study described below aimed to find whether there is a connection between reading skills quality and comprehension of verbal mathematical problems. We believe that this type of study will help educators to understand the preliminary approach and the interpretation of students that have difficulties to solve verbal problems in mathematics, regarding the issue, and re-examine their views on this issue. The findings of this study can also shed light on the needs of these students and help teachers to construct teaching methods and learning programs adopted to these specific needs.

Research conjecture: a connection will be found between reading deficiency, and students' ability to deal with verbal problems in mathematics, due to the fact that comprehension of the verbal problem requires good mastery of reading skills.

Research question: is there a connection between inability to solve verbal problems in mathematics and reading deficiency?

2. Literature Review

Several children have difficulties in reading and even acquiring reading despite efforts to help them. These children read slower than expected from their peers even though they do not have any medical problem or lack of intelligence. Sometimes the difficulty depends on the size of the letters or the density and/or length of the text, while when the text is read to them verbally, they understand and remember it.

Research of learning deficiencies began in the 19th century, when clinical findings raised the attention of educators and policy makers to mental and cerebral damages, mainly in the language related areas – speech, writing and reading, that affect the learning processes. During the 20th century, the research field focused on seeking solution to learning deficiencies (Grant, Ramcharan & Flynn, 2010).

According to Grant, Ramcharan & Flynn (2010), in order to identify and examine deficiency, the ability of the given subject has to be compared to peers' abilities. Thus, although some aspects of learning deficiency like: cognitive ability, reading ability, level of academic achievements and response to instructions can be measured, other aspects, like the subject's mood, health (physical or neurological factor), learning conditions, teaching methods and peers characteristics, as well as textual factors, differ from one test to the other, and from one study to another. Therefore, there is a wide range of definitions relating to learning deficiencies.

Other studies found that physical history, and diverse neurological conditions affect a person's learning ability (Cortiela, 2014).

The most common and recognized learning deficiencies are:

Dyslexia – reading deficiency;

Dysgraphia – very poor writing and spelling;

Dyscalculia – inability to perform basic calculations, and

ADD – Attention Deficit Disorder.

However, since we deal with a students' failing to understand verbal problems, there is a need to consider a possible lack of reading comprehension.

Characteristics of Learning Deficiency

Most scholars agree that the first step required to help children that have difficulty to progress in school, is to determine the problem causing their inability to keep pace with the class. Several factors contribute to low academic achievements. Some of the factors affecting the student's achievements level, like the social and environmental background, learning conditions or a traumatic life changing event, are external, while others factors, like: student's behavior, attitude, health, cognitive ability,

comprehension of instructions, language and school related technical skills and even his/her response to specific teaching approach, relates to the individual student. Children with low achievements either due to external factors or due to behavioral or mental disturbances are not categorized as children with learning deficiencies. However, when distinctive low achievement come together with poor learning related technical skills and difficulty to understand instructions, it can certainly indicate some kind of learning deficiency.

Studies show that there is a distinctive connection between student's misconduct in school and low achievements, however, misconduct might be caused by frustration due to inability to overcome difficulties: for example, a student who cannot read properly has difficulties to complete tasks assigned. Repeating failure decreases his/her self-confidence, which might lead to disinterest and misconduct, and vice versa. Sometimes it is difficult to determine which the primary is and which the secondary problem is.

Reading deficiency - Dyslexia

Definition: Reading deficiency is one kind of learning limitation characterized by the child's reading difficulties or inability to decipher specific text or specific words; it does not relate to intelligence, people with high intelligence, even adults, can also be dyslexic. People with reading deficiency read much slower than their peers.

Dyslexia is a deficiency relating mostly to difficulties in reading and writing, but it also affects the child's ability in language related subject (grammar, spelling and expansion of vocabulary), and other academic subjects, like mathematic and various academic subjects in which understanding and progress depend on the ability to organize the sequence of the ideas or the plot.

A child with dyslexia has problems in starting to perform a writing task and difficulties in organizing the writing sequence. His/her writing is often poor and unclear; he/she might have spelling mistakes alongside difficulties in building a sentence correctly. He/she can also have diverse linguist difficulties, including a difficulty to understand mathematical language; to remember mathematical formulas, or the sequence of actions required, and in reading and copying problems, interference in directions orientation and reversing symbols and numbers.

These difficulties affect the child's learning ability as he/she has difficulty to organize time, complete assignments, combine knowledge from various sources, remembering and memorizing material, make technical use of printed or computerized databases and succeed in tests, despite mastery of the material.

According to Snowling (2019), literacy is an important linguist skill, essential to the person's basic survival, as in modern times, illiterate people have very few work opportunities. It is also essential for daily life, from reading written cautions and instructions, using digital devices to read and write massages, to using automates like ATM, driving and any other activity involving written directives. When an individual cannot read or write not because of lacking education, it is called "reading deficiency".

Due to the fact that reading deficiency is part of learning deficiency, certain voices in the field raise doubts at its actual existence. Fawcett (2002), claims that denials of reading deficiency existence, derives from personal agendas. Each of the factors involved, parents, teachers, the school and educational authorities, has its own reasons to object diagnosis of reading deficiency: some parents resent the diagnosis because they object to the idea that their child is identified with a limitation, while the educational authorities raise objections because special treatment and special considerations require additional budgetary allocations. In fact, there are several evidences showing that most reasons that cause people to doubt this limitation derive from personal agendas and not from an objective position regarding the situation.

The signs of reading deficiency were found similar in every culture studied. People afflicted with this limitation have difficulty to identify words properly, regardless of instructions and level of intelligence. They have no difficulty to understand text, but cannot decipher a given word or words.

In the past, children that had difficulty to understand text or instruction were also categorized as afflicted with reading deficiency. Thus, it is imperative to differentiate between these two groups, because each of them is afflicted with a different limitation. Today it is assumed that about 7% of the world population has reading deficiency (Reid, 2016).

Factors affecting reading ability

Reading ability is affected by factors of different type; behavioral, biological and cognitive. Note that people dealing with reading deficiency have different roles and therefore usually most of them tend to be interested in one specific causal factor, while teachers and psychologists might show more interest in the behavioral aspect, the neurologist will show more interest in the biological and neurological aspect (Shankweiler et al., 2017).

Behavioral factors can arise from external factors, but can also relate to ADD, a biological disorder affecting the child's attention and concentration abilities. Other important biological factors are sight quality and neurological disorder. Poor sight quality can be measured and treated, but sometimes the problem could be a case of cortical sight, a disability to decipher the information received by the eyes and/ or process visual information. Thus, if medical examinations indicated that the given child eye test is normal, but the child seems to lack the ability to process visual information, there might be a need to check a possible connection between ADD and the visual attention capacity.

Many studies investigated the possibility that the neurological aspect could be genetic. Studies, that focused on the functioning of brain areas responsible for reading process and word formation. For example, studies that scanned the brain area responsible for deciphering words (Singleton, 2009), revealed that pressure disturbs the words deciphering process because it is busy with other information that interferes with words deciphering efforts. This interference makes it difficult for the child to understand the text he/she reads and requires him/her to read it repeatedly. The findings also revealed that the pace of data processing also affect reading capacity. In many cases, the child is born with slow information processing ability, but this ability can be practiced and improved. These

studies and others also found that reading deficiency can be genetic: if the father suffers from reading deficiency, the chance his children would suffer from reading deficiency, will be about 40% (Shankweiler et al., 2017).

Reading deficiency in different cultures.

In the early stage of scientific interest and research of reading deficiency, was done in English speaking countries, but in the recent two decades, studies that were carried in other cultures and languages revealed that reading deficiency exists in other cultures and languages as well. Without these other studies there could be claims that the data is biased, since orthographically, there are significant differences among languages, as in some languages there is a high match between each letter and the sound produced and in other languages there is no high match, as a given letter can represent more than one sound, making the reading more complex. In addition, a specific sound, can be represented by more than one letter. The English language is one of the languages that represents this lack of transparency; it has several words that are irregular, and has letters that represents more than one sound, while the German language is a language of high transparency; once the sound of each letter is learned, the words should be read correctly. Nevertheless, there are students suffering from reading deficiency in Germany, so although orthography affects reading ability, and more so in languages with low letter-sound match, it is definitely not the causal factor of this disability (Peterson & Pennington, 2012).

In Semitic languages most letters symbolized constants, and most vowels are inferred by context and connotation; in addition, some words sound similarly but spelled differently while others are visually similar but should be pronounced differently, which makes them languages with low transparency.

This study was conducted among Arabic speaking students in Israel. Therefore, we have to consider other factors affecting students' reading difficulties, like the fact that Arabic is a double language: a spoken language that has distinctive local/regional features, and the standard written language which is a different version of Arabic, organized according to morphologic and grammatical rules, that the students meet first in school. Written Arabic is considered by many as almost a second language.

In addition, when we look into verbal problems in mathematics, we have to consider the fact that Semitic languages are written from right to left, while Mathematic sentences and formulas are written left to right, a fact that might add to students' difficulty to translate verbal data into mathematical sentences.

Treatment

Usually, treatment of children with reading deficiency is provided by teachers, who were trained to teach children with this limitation. The treatment strategy used to treat this deficiency is determined by the teacher, according to the needs and the severity level of the given student. Note that there is no treatment that heals this disturbance, but there are ways to reduce it and help these children to overcome certain aspects of their reading difficulty. Since this limitation does not relate to student's

intelligence, the student is able to understand the teacher's instructions. All studies recommend that in order to get good results, intervention should be carried in the earlier stage possible.

Teaching methods have great importance in treatment of learning deficiencies. Mathematics is a learning subject that challenges students, since they are required to possess logical thinking that will enable them to cope with research tasks, representation of states through illustrations and mathematical representation and understanding of traits and connections between concepts. Traditional teaching methods do not always deal with learning effectiveness and its suitability to every student, because it treats all learners in homogeneous way, the learning structure is strict, and there is very little use of illustrative means, making it unsuitable to the needs of students that have difficulties in mathematics.

On the other hand, active learning enables a better experience since it emphasizes sociality and humanity when the learner and his/her specific needs are the focus of attention and the teacher develops learning programs adopted to every individual student (Freeman, 2014).

In special education frameworks, educators use combination of diverse therapeutic factors and unique teaching methods defining and considering the requirements of the learner depending on his/her abilities, are carried out. The learning program designed for him/her accordingly. According to Freeman (2014), teachers using an active learning method use diverse materials and stimuli, incorporate team work and parental involvement. Their teaching aim is not just delivering the learning material in an orderly manner, but oriented towards development of mutual aid and reduction of competitiveness. Creation of a relaxed non-competitive climate, allows the student who has learning difficulties, to regain his/her self-confidence and stop comparing his/her achievements to others'.

The study revealed that students who learned in active learning method considering their needs and specific difficulties, coped better with Mathematics and shown a definite improvement in their achievement level.

Verbal problems in mathematics.

Definition: A mathematical problem is a situation in which an individual or a group of people are asked to perform a task that has no immediate ready algorithm defining a method to reach solution. A verbal problem in mathematic is an independent text including a question and describing an event (Cortiella, 2014).

The Importance of Verbal problems in Mathematics.

Verbal problems are one of the main subjects in mathematical education, as they enable the learner to identify, experience and understand mathematics, to judge the role of mathematics in present and future personal life of the individual, apply mathematical tools and concepts to solve problems in the social, professional and personal life of the individual and as a constructive and reflective citizen.

The difficulty in teaching verbal problems is known to everyone involved in mathematics; students who master different mathematical skills cannot overcome the difficulty presented verbally since the

arithmetic action required is not defined. It appears that in addition to the technical mathematical solution, such problems require an additional skill relating to processing the given information and choosing the course of action (Nesher, 2020).

Kuzle (2013), proposes an innovative computerized learning environment known as "No problems in problems solving" this is a software aiming to deal with characteristic failures in the field of math teaching in schools. This computerized environment provides tools to college teachers and is specifically suitable to teachers teaching an academic subject considered among the more difficult teaching and learning subjects. The software provides a pool of 55 verbal questions of various types, ready and adapted to in-class activating.

The computerized learning environment was designed to help the students to cope with difficulties in solving verbal problems and enables them to need less help and guidance during their learning process. Increasing the students' ability to cope with problem solving on their own, strengthens the students' self-confidence. A success to reach the correct solution on their own reduces the level of anxiety regarding mathematics.

The study (Kuzle, 2013), examined a sample of 441 8^{th} grade students. The findings of the study revealed that students who received meta-cognitive treatment during mathematical problems solving, achieved higher scores in both performance and representation, compared to students who received the treatment at the end of the process and those who received only feedback.

Collaborative learning in a computerized environment adds a layer to the learning; by helping the learner to remain active throughout the learning process, develop important meta-cognitive knowledge about thinking processes and the ways to control them.

Since the proposed model in that study is both modular and applicable, it deepens the understanding of processes that takes place in the learner and can help teachers to teach children how to solve verbal problems in mathematic.

"It is commonly assumed that the more a person controls and monitors the strategies he uses, the better his ability to solve problems will improve" (Schneider, 2010).

According to Cincinnatus (2014) the teacher has an important role in determining the problem solving modes chosen by his/her students. Therefore, to change the students' attitude towards problem solving, there is a need to change the teacher's beliefs, perceptions and knowledge regarding the teaching of mathematics, and problem solving in particular. The researcher examined if performance of planned teaching sequence can lead to change in perceptions of teachers and teaching trainees, regarding the role of mathematics and the meaning of adapting a mathematical model in solving verbal problems (modeling process). Although some reduction in using traditional statements relaying on standard conventional solutions and increase of alternative statements relaying on mathematical models had been observed among the research' participants, examinations conducted before and after the intervention indicated that the participants' use of traditional approaches was more common by far than the use of alternative approaches.

Barwell (2020), who investigated learning mathematics as in-class social activity. In each of the classes investigated in their study, the teacher agreed to conduct a discussion with the students on the meaning of mathematical difference. No criteria were set in advance and there was no attempt to direct the students; thus, the students were forced to suggest ways to reach solution without knowing how the teacher would actually treat their suggestions. Thus, the meaning of mathematical difference was interactively constructed by teacher and students together.

3. Materials and methods

The purpose of the study was to find out if difficulty of students to solve verbal mathematical problems is caused by reading deficiency. The study is a combination of a preliminary test aimed to identify children that have difficulties in solving verbal mathematical problems, and a continuing qualitative study that was conducted with a sample of the students who failed the preliminary test (scored below 60 points, which is a minimal satisfactory mark).

Ethics

1. The researcher approached the schools' principals and received their permission and approval to include a number of 7th grade students of their schools in his study.
2. As the future participants were minors, the researcher sought and received parental permission.
3. Before the actual study started, the researcher met the participants, explained to them the purpose of the study, promised them absolute anonymity, and then told them that the results of the test they were about to take, will not be counted for their school records, it is only for research, therefor, there is no pressure, if they happen to encounter a question they cannot solve, they do not have to do it.

Research population

The preliminary exam was attended by ninety 7th grade students from three Arab schools in Israel, about 30 students per school. The participants were given a mathematical test containing 10 verbal mathematical problems considered easy for the average level of 7th grade; the text required understanding the task and translating the data into mathematical format. The end tasks included basic level of addition, subtraction, multiplication and division. (See attachment A).

Table 1 – She participants' sample by school and by gender

School	Boys	Girls	Total
School A	12	17	29
School B	16	15	31
School C	16	14	30
Total	44	46	N=90

Research tools

1. A set of 10 verbal mathematical problems considered easy for 7th grade average level. This was a preliminary test attended by all 90 research participants.
2. A personal interview conducted with 10 students sample, selected at random from the 32 students who failed the preliminary test.

The course of the study

After all the participants submitted their finished tests, the researchers conducted analysis of the results. The findings indicated that the scored received could be subdivided into 3 levels: A - good and very good students, who scored 75-100, B- average and nearly average students who scored 60-74, and C - weak students who scored 0-59. The second stage of the study was conducted with a sample of 10 students selected from those who failed the preliminary test. The sample included students from each of the schools that participated in the study.

Following are examples of the questions asked:

- "If Amir has 85 books and Jamil has 15 books less, how many books the two of them have together?"

A simple question that requires two actions of calculation, the first is subtraction, and the second is addition.

- "Sami bought 16 pencils and 15 rulers. The price of a single pencil is 9 Shekels. The price of a ruler is three times higher than that of a pencil. How much Sami paid for the entire purchase?"

The second example represents one of the more demanding questions, since it is more complex, requiring 3 actions of multiplication and one action of addition. (See attachment 1).

Data analysis

First stage:

1. Scores analysis and division of the results into 3 categories: A -good/very good (75 to 100), B -Average and almost average (60-74), C-weak/unsatisfactory (0-59).
2. Analysis of each test. Answers in each test were categorized into 3 categories: correct solution, wrong solution, and no attempt to solve.

Second stage: (a qualitative study based on personal in-depth interviews with a selected 10 students' sample).

Selection of 10 students' sample for the qualitative study. (Personal interview)

During the interview, the researcher referred to questions the interviewee failed to solve due to mistakes in his/her calculation, and questions he/she answered partially and answers he/she did not

answer at all. The researcher conducted a conversation with the interviewee, discussed his/her feelings regarding the test, explained each of the questions to the student and then asked each of the interviewees to retry to solve all the questions he/she failed to solve in the test, in his presence.

The interviews and been recorded and transcribed.

The interviews were analyzed according to content. At first, all the transcribed interviews were carefully read, and the main topics were emphasized, to be later compared and re-organized into themes.

4. Results

The purpose of this study was to examine the connection between students' difficulty and/or inability to solve verbal mathematical problems and reading deficiency, among 7th grade students in Arabic schools in Israel.

Findings of the preliminary test

Table 2 - Analysis of the participants' answers to the preliminary test comprised of 10 verbal mathematical problems.

Problems' No	Correct solution	Partial solution	No attempt to solve
1	35	27	28
2	41	30	19
3	39	26	25
4	33	35	22
5	37	33	20
6	43	28	19
7	35	27	28
8	40	30	20
9	31	40	19
10	38	33	19
N=90			

Table 3 – Analysis of all the preliminary test result according to scores category of 0 - 100

N = 90	Scores: 75 to 100	Scores: 60 to 74	Scores: 0 to 59
No of participant	21	37	32

Findings of the qualitative study

Table 4 – division of the participants according to school and gender

School	Boys	Girls
A	2	1
B	1	2
C	2	2
Total	5	5

5. Conclusion

Data processing developed during the course of the study. The interviews were recorded and transcribed. The analysis makes it possible to see the complete set of data and examine it all based on the research objectives. It also enables identification of the key issues of the question investigated.

As mentioned above, the data had been gathered by means of content analysis. The content analysis yielded the following themes:

Theme 1: failure to solve verbal mathematical problems was caused by difficulties in text comprehension.

The participants reported that they felt stressed and could not concentrate on the task, because they were unable to read and understand the question and could not figure out what was required of them. Others claimed that the stress of having to read and translate verbal information into a mathematic sentence, and the inability to comprehend the textual content, impaired their ability to concentrate on the task. Some of the participants complained about the time allocated; they said that since they have reading difficulties, the time allocated was not enough, especially regarding the more complex problems.

"*I understood all the questions, and I could pass the test, but when I see a question with a lot of text, I can't solve it because I don't have time"* [participant No. 2].

Others complained that they had to read and re-read the text to understand what was required, and there simply was not enough time to complete the task. One participant told the interviewer that he asked the supervisor to give him more time to complete the problems but his request was denied. Other participants complained on the complexity of the problems:

"*The questions were complicated and hard to understand since I also have difficulties with questions relating to multiplication and division. When I see a question that has multiplication or division I am frightened because I know that I can't solve it"* [participant No. 8].

Participants, who did not try to solve one or more of the problems, admitted that they are aware of their reading limitation, so when they saw a long text they decided skip it and did not even try to read it.

Some of the participant revealed lack of self-confidence in their reading and comprehension capacity and dependency in help of others.

"*I don't understand the stories and I don't know what I have to do. Someone has to read it to me."* [Participant No. 2].

"…*because I cannot solve without help. I am always being helped, my parent or a private teacher or my home-teacher in class help me to understand".* [Participant No 6].

"*Math is difficult if others don't help you*" [participant No. 10].

However, some of the participants were defiant, demonstrating contempt and disrespecting behavior to camouflage their inability to cope with the task:

"*Balloons, who needs them?" and: "The price of a ruler, indeed! How does it help me?"* [Participant No.5].

"*With lack I can solve even a difficult question*" [participant No.1]

Peers' influence:

"*I saw that my friend does not take it seriously and skips problems, so I did the same, after all, this test has no weight on the school certificate*." [Participant No. 10]

The findings indicate that although most of the students included in the qualitative study [90%] failed the preliminary test due to reading deficiency, inability to concentrate and lack of self-confidence and motivation, some of them admitted to have difficulties in Math [understood the problem but could not tackle multiplication and division]. Therefore, although most of the students that failed the preliminary test failed due to difficulty in comprehending written material, we have always keep in mind that some of the students lack the required mathematical skills.

Theme 2: reluctance and apprehension to deal with verbal problems, Due to lack of self-confidence, law self-image and self-esteem and disbelief in self-efficacy, leading to resentment and lack of motivation.

The findings confirm the assumption that students with reading difficulties, for whatever reasons, will find it difficult to solve verbal problems in mathematics. The main difficulty observed was the issue of text comprehension as most of the children that failed the initial test had difficulties to follow and understand the written information and could not figure out what they were asked to do and the order of the required actions.

During the personal interview, some of the participants admitted that they have difficulty to infer the content of the questions, and others admitted that they have difficulty in calculating, especially when the task includes multiplication and division. Others tried to justify their failure with excuses like stress, lack of time, problems complexity, inability to concentrate and fear of coping with verbal problems due to lack of belief in self-efficacy. The findings also indicate that in addition to reading deficiency

and poor mathematical skills, peers' influence and personal factors like stress, lack of concentration, low self-image and self-esteem and habitual dependency in the help of others, also contributed to the reluctance of students to solve verbal problems in Math.

The findings also revealed that inability to explain the failure lead to low motivation: some of the participants expressed disinterest, dismissed and even ridiculed the need to solve verbal problems.

6. Discussion

The subject of achievements in mathematics annoy many educators because mathematics is considered one of the difficult fields of learning for students, and the difficulty begins already in primary school. (Nesher, 2020). The problem is more complexed when we talk about pupils with learning deficiencies. (NCES, 2013). This study was conducted in this context and in light of other studies investigating the connection between reading deficiencies and students' ability to solve verbal problems. The purpose of this study was to examine the connection between difficulty among 7th grade students in the Israeli Arabic education system in solving verbal problems in Math and reading deficiency. The study had been conducted with an initial sample of 90 7th grade students, 44 boys and 46 girls, from 3 different schools. After the preliminary test comprised of 10 verbal math question, that was attended by all 90 participants, the researcher had conducted a quantitative study with 10 students, selected from the 32 students who failed the preliminary test.

The research findings yielded two main themes: the first, confirmed the research conjecture, as it indicated that success in solving verbal questions in Math does depend on reading quality, reading difficulties disturb the reading flow and text comprehension and affect the students' success in the context of understanding the content of the written materials and the task required to solve the problems. It also contributes to the stress experienced by students facing verbal problems in Mathematics. The students' awareness of their reading difficulty impairs their self-confidence and their willingness to deal with the challenge.

This finding supports the claim of WitaHaraha (2017), that children with learning deficiency experience difficulties in learning and that these difficulties define their general attitude towards learning, which can affect the measure of their success.

The second theme that arose in this study is that students with learning deficiencies, who get low scores in Math, report low self-image, disbelief in their own capacity, and fear of dealing with difficult materials, test related stress and low learning motivation.

The findings had no evidence of dyslexia derived from neurologic genetic causes, as children suffering from severe dyslexia, expressed by inability to decipher the meaning of words, misreading letters and digits, or reversing their order, were probably identifies at an early stage, and treated in different educational frameworks. But it is possible, that one aspect of dyslexia, a slower word processing, which is less severe, could have been present among some of the participants. The same goes for children with severe ADD.

The finding of this limited scope study revealed that the main obstacle of the students who failed the preliminary test was text comprehension; difficulties [and/or inability] to understand the written materials prevented them from understanding what they were asked to do, while the other factors such as stress, lack of concentration, time, self-confidence, etc. only worsen the situation.

Since the study had been conducted with Arabic speaking participants, it is also possible that the fact that Arabic is a double language and not all students master the standard written Arabic, alongside the fact that its orthography is not transparent, could be one of the reasons why the ratio of Arabic students in Israel who have problems in solving verbal problems in Math is higher than that of children speaking languages that have no such features.

Theoretical and practical Contribution

The study expands the existing knowledge regarding the impact of reading deficiencies on achievements in the area of solving verbal mathematic problems, as it presents and analyzes the view point, experience, perception of the given task and the way the students that have difficulty to cope with written verbal information estimates his/her skills and ability.

The findings of this study indicate that students with learning deficiency tend to have low self-image and lack of motivation to make an effort and overcome their difficulty, especially regarding mathematics, a learning subject many factors consider to be one of the fields of study that many students have difficulties in learning. Thus, in order to improve the achievements of these students, there is a need to improve their self-image, self-confidence and motivation. As most students with reading difficulty are aware of their predicament, there is a need to change the nature of teaching and adapt the teaching methods to the learners' needs.

Study's limitations.

The study was a limited scope study, conducted with relatively small culturally homogenous population, so although it is interesting and relevant, it will take a much more extensive and comprehensive study, or a number of similar studies in various schools, various educational systems and various cultures and languages, to know the extent of the issue.

Recommendations

1. As reading is an essential skill for learning most academic subjects, there is a need to improve reading skills of all students who have learning deficiency to insure their ability to understand the materials and progress. Therefore, educators have to design and construct advanced teaching methods to cater for the needs of the learners.
2. I recommend examining intervention programs in practice, to find out which programs can improve self-image, self-confidence and motivation of children with learning deficiency. Regarding the subject of this study, I suggest that to make the verbal content accessible to students with reading deficiency, it could be taught - perhaps first as an experiment - in an

audio form: make the content accessible by reading it aloud, so text comprehension will be taken out of the equation.

3. Conduct similar studies on a much larger scale: many schools, different sectors [culture & language] diverse social strata, and different educational systems, to receive a wide comprehensive picture of the issue.

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Disclosure statement

The author report there are no competing interests to declare

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Attachment

Attachment A: The preliminary test: verbal problems in mathematics

1. I had 7 pens, and I got 9 pens from my friend. How many pens I have now?
2. Michael is 37 years old and his sister is 10 years younger. How old is his sister?
3. Yazan is 6 years old and his mother is 30. How old he will be when his mother will be 45?
4. If Amir has 85 books and Jamil has 15 books less, how many books they have together?
5. If a father has only 15 balloons, how many balloons he needs to buy in order to give each of his 4 children 6 balloons?
6. Said resides in the second floor. He bought 19 crates of carbonated drinks. How many times he must climb the stairs to his flat if he can carry only two crates the time?
7. Sami bought 16 pencils and 15 rulers. The price of a single pencil is 9 IS. The price of a ruler is three times the price of a pencil. How much Sami paid for the entire purchase?
8. A worker finishes a job in two days. In the first day he completed 3/8 of the job. What part of the job the worker completed on the second day?
9. Mother made a jam from cherries and almonds. For each kilogram of cherries, she added 0.25 kg almonds. Mother used 10 kg of cherries, how many kg of almonds she used?

10. For class graduation party the parents' committee bought: 100 buns at the price of 1.5 IS, 10 bottles of drinks at the price of 4.6 IS a bottle, and 100 small gifts for the children with average price of 20.5 IS a gift. How much did the whole purchase cost?

Attachment B: Transcriptions:

Question = Q, Answer =A

Pupil No 1.

Q: What did you feel during the course of the test?

A: The questions were hard; I couldn't solve because it didn't work out for me.

Q: OK, but question No 6 is the hardest one in the test, and you solved it correctly. This is excellent!

A: [Laughing], Lack!

Q: Really?

A: Yes, I simply did not understand the questions.

Q: What was so difficult in the questions?

A: Each question is a big story and I couldn't arrange the data all by myself.

Q: I give you another opportunity to solve the questions of the test, will that be OK?

A: It wouldn't help, I cannot connect to questions relating to verbal text and I have difficulties with the mathematical operations, usually when there is more than one action.

Q: why being shy? Let's try!

- When I read him the questions of the test he solved correctly all the questions that required one action, but it had taken him a very long time. Questions that required more than one action he did not solve at all.

Pupil No 2.

Q: what did you feel during the course of the test?

A: I did not read the questions.

Q: You did not try to solve?

A: cannot solve this type of questions. Do not understand verbal questions. In addition, the test was long and I have trouble with math and don't do well on exams.

Q: do you have difficulties in all the mathematical subjects or only specifically with verbal problems?

A: only in this subject, I don't understand the stories and what I am supposed to do. Need someone to read to me.

Q: If someone reads to you do you understand?

A: I understood all the questions and I had no problem with the test. But I have trouble with mathematical problems in which I am told long stories. When I see a question with a lot of text I cannot solve it because I don't have enough time.

Q: come on, let's take another chance and I shall help you with the reading.

- After I read it to her for the second time, she started solving, and succeeded to solve correctly.

Pupil No 3.

Q: what did you feel during the course of the test?

A: very hard. Verbal problems! I would not even try. First, I have to know to read and understand.

Q: what were the reasons that made you feel difficulty?

A: there was not enough time; I did not understand the questions. This is why I did not solve the test. For me, a question that required two actions was too difficult, and I was pressed with the time. In addition, I did not understand the long questions with the long story, I don't understand why asking questions in such complicated form.

Q: a lack of time is a problem. If I will give you more time it will suit you?

A: Sure! I asked the supervisor and he refused!

- He could not do it without help in reading. So I read to him each of the questions separately, and he solved them correctly.

Pupil No. 4

Q: What did you feel during the course of the test?

A: I understood all the questions and had no problems with the test, but I have difficulties with questions relating to multiplication and division. When I see a question with multiplication or division I am anxious because I know that I cannot solve it.

Q: were you OK with the rest of the questions?

A: Questions with adding and dividing are the easiest. I have difficulties with multiplication and division.

Q: what is your difficulty in multiplication and division?

A: I don't know when to use them, do not understand the phrasing of the questions. Also, I could not read and understand what I have to do so I got stressed and could not concentrate and solve.

- Let's try again to solve.
- I explained the questions to him so he will try to solve on his own. Understanding the question helped him to progress. He managed to solve some of them but still had difficulties to cope with multiplication and division.

Pupil No. 5.

Q: What did you feel during the course of the test?

A: the test is very easy.

Q: so why you did not solve?

A: leave me of these stories.

Q: what stories? Explain to me.

A: A father has to give his children balloons in a question! And in another question: what is the price of the ruler! How does it help me?

Q: did you like the other questions?

A: yes.

Q: No problem, I can give you another chance to take the test

A: OK, but how I will know the number of books or the price of the ruler?

- I explained to him the questions but he was afraid even to try to solve them. He felt despaired and did not want to continue. Finally, he said:
  "*I read and I did not understand some of the questions, but most of the questions were too difficult and complicated to understand. I do not connect to questions relating to verbal problems. They stress me and I cannot concentrate.*"

Pupil No.6

Q: what did you feel during the course of the test?

A: I tried to solve all the questions. I wasn't sure what was required in the questions, I don't know to solve, so I asked the supervisor for help but he did not answer me.

Q: why did you ask for help?

A: because I don't know how to solve without help. Always my parents or a private teacher or my home-teacher help me.

Q: Did you understand all the questions?

A: Yes, but I always feel that I want help, or little explanation.

Q: Take the test again, and if you have a question I will help you.

- In each question she asked for help, despite the fact that she could solve it by herself, but she always asks to insure that she is on the right track.

Pupil No. 7

Q: what did you feel during the course of the test?

A: a hard test.

Q: But you solved 3 questions correctly –

A: yes, I tried and it turned out correct.

Q: How did it turn out right?

A: I don't understand and cannot start solving, the correct answers are only because I have good lack.

Q: lack will not give you correct answers, never.

A: yes, but it was too complexed and I did not have enough time. I did not understand the questions this is why I did not solve the test. Questions with two actions were too hard for me so I got stressed. In addition, I did not understand the long questions with long story. I don't understand why asking questions in such a complicated way that only heaven can help.

- I read her the problems aloud, and she had managed to solve the easy ones.

Pupil No 8

Q: What did you feel during the course of the test?

A: Do not know.

Q: How come? It was an easy test, why you did not answer the questions?

A: I do not get along in Math with text needing reading, always get stressed.

Q: Does it mean that if you are asked to solve formulas without text you can do it?

A: Don't know.

Q: try to explain.

A: The questions were complexed and hard to understand. I have difficulties with questions that have multiplication and division. When I see a question with multiplication or division I am scared I know that I will not concentrate and I cannot solve it.

Q: Does it mean that you don't understand the questions?

A: Don't understand and cannot start solving.

- Come, I shall help you and you try solving again.
- I read to him the test and he managed to solve about half of the questions.

Pupil No 9.

Q: What did you feel during the course of the test?

A: There was not enough time, and… I was stresses by the time.

Q: But you solved two questions correctly, and I see that you tried to solve more –

A: Yes I tried but I knew it was wrong.

Q: How did you know?

A: From the beginning in some exercises, I don't understand what is given and is asked.

Q: Do you mean that you could not read the questions and understand, or the difficulty was in the questions' themselves?

A: I was stresses, there was not enough time. I did not understand the questions. I tried to re-read what is required again and again, several times.

- Come on, I will help you in the reading and you will try again.
- I read her the test; she managed to solve the problems considered easy, and attempted to solve questions that were more difficult.

Pupil No.10

Q: What did you feel during the course of the test?

A: A hard test.

Q: This is why you solved none of the questions?

A: Yes, I did not try.

Q: What was the cause of your difficulty?

A: Don't now, but everything is difficult. Mathematics is hard if you are not being helped.

Q: Are you good in the rest of the subjects?

A: Yes and no, if things involve sitting for a long time to read and understand then no.

Q: Why you did not succeed in this test?

A: For no reason.

Q: Can you read to me what had been asked in the first exercise?

A: I understand everything and I can solve but the truth is that I saw a friend of mine does not take the test seriously and does not try to solve I did just what my friend did, as this test does nt count in the score on the certificate.

- Come, I shall help you in the reading and you will try to solve one more time.

  I read him the test and he managed to solve most of the problems.