Elementary Students Perceptions Towards Mathematics Problem Solving

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Abstract
Real life problems can be found within schools' curricula, such as in mathematics, and solving mathematical problems, addressed to as *problem solving* in this study, often relate mathematics to real life situations, contexts students are familiar with and can relate to. However, students worldwide often comment that Mathematics problems are really difficult, and Lebanese secondary teachers complain that students reach Grade 12 and are still unable to think logically. Therefore, this article reports on a part of a larger study that aimed to understand students' challenges and perceptions towards problem solving (PS) in Grade 4, 5, and 6 (n=558) in private schools in Tripoli- Lebanon. The researcher used the questionnaire method to collect data, summarize and analyze students' perceptions towards PS. Findings indicated that language and analytical skills are among the most challenges faced by students. Recommendations for acknowledging these difficulties and adopting teaching strategies that tackle these problems were also provided.
Keywords: Mathematics problem-solving, Elementary, Cycle 2, Students perception.
DOI: 10.7176/JEP/14-27-03
Publication date: September 30th 2023

1.Introduction

Solving mathematical problems is at the heart of mathematics education. It is the first process standard in the Common Core State Standards (NGA, 2010), the third aim in the British Mathematics curriculum (GOV.UK, 2013), and the second general objective in the Lebanese Mathematics curriculum as stated in the official newspaper issue (1997). In Lebanon, students face difficulties in solving mathematics problems, and the difficulties are related to failure to understand the mathematical problem, devise a suitable strategy to solve it, carry out a plan to implement the suitable strategy, conduct deductive reasoning, understand-apply mathematical concepts, comprehend mathematical texts, and write mathematical texts (Al-Masri, 2013; Mikati, 2017; Mahfouz 2023). Moreover, Lebanese students' in international exams such as PISA and TIMSS showed low scores compared to other countries (TIMSS & PIRLS, 2016; Harmouch, Khraibani & Atrissi 2017, TIMSS & PIRLS, 2019). On the national level, students' success in mathematics in Brevet and Baccalaureate exams "does not have any scientific indication about the educational situation" according to Mahfoud (2023), a secondary Mathematics teacher and the President of the Teachers' Syndicate in Lebanon, who confessed in an interview with the researcher: "it is enough for a student to study the study-guides (annals) and memorize the exercises included to guarantee passing the exams since the questions are similar each year." He also added, "students memorize the solutions; if we make few changes in the given, they get lost because they don't know how to think." Hence there is a need to investigate if this difficulty is rooted at the elementary level since problem-solving skill is the corner stone for elementary students to pursue mathematics learning in the successive grade levels.

2.Theoretical Framework and Literature Review

For Piaget (1976), children develop as they confront new and unfamiliar features of their environment that do not fit with their current views of the world. Piaget refers to this effort of connecting existing ideas to new information where people modify their existing schemas to incorporate new ideas as *reflective thinking* (Fosnot, 1996). However, the child's intellectual growth is contingent on his mastering the social means of thought, that is language (Stierer and Maybin,1994). Vygotsky (1962) argues that communication is the driving force behind speech in both adults and children. He perceives language development as a process which begins through social contact with others and then gradually moves inwards through a series of transitional stages towards the development of inner speech (Vygotsky et al, 1929). For Vygotsky (1978), the development of inner speech (self-talk) is the outcome of the transformation in thinking achieved through a process of internalization in which language is the key ingredient. He believed that inner speech plays an important role in self-awareness, self-understanding, and working memory as well. This suggests that inner speech is linked to the development of language abilities and the advanced mental abilities to which language is linked (Ehrich, 2006).

Drawing on Vygotsky, Egan (1997) argues that the development of language begins with external social interaction with others and becomes internalized as the child matures. Therefore, the culture in which children grow up shapes their psychological make-up and will have a significant effect on the understanding that they construct of the world around them. Intellectual development could be said to be dependent on a person's ability to use tools such as language effectively in different learning settings. Earlier, Bronfenbrenner (1979) in his Bioecological Theory of Development, highlighted the equal partnership of nature and nurture, heredity and environment. Therefore, social interaction is essential for learning to occur. Thought and inner speech development are determined by language and by the sociocultural experiences of the child.

2.1 Language and Mathematics

It is known that a *word problem* is a mathematical calculation embedded within sentences (Powell, 2011; Riley & Greeno, 1988). Therefore, to solve word problems, students use text, typically presented in English (for English speaking students or students who study Mathematics in English), to identify missing information, make a plan to solve the problem, and perform one or more calculations to get the solution (Powell, 2011). The language and multi-step processes inherent in word problems can pose particular difficulties for English Language Learners (ELLs; Martiniello, 2008). For Mikati (2017), her study on Lebanese Grade Five students revealed a strong relationship between English and word problem-solving tests. Similarly, Masri (2013) explored the language difficulties the Lebanese middle school students (Grades 6 to 9) face when constructing and formulating geometric proofs. The results showed that students' difficulties when constructing and formulating geometric proofs are related to difficulties in understanding the notion of proof, setting proof plans, conducting deductive reasoning, understanding-applying mathematical concepts, comprehending mathematical texts, and writing mathematical texts. Yet, these difficulties varied in their level from grade level to another and according to the proof and language complexity levels of the proof tasks (Masri,2013). Hence reading and writing are pillars for solving mathematics word problems.

2.2 Reading and Writing in Mathematics

Communication is identified in The Common Core State Standards for Mathematics (CCSS-M) as the third among five common standards (Van De Walle, Karp & Bay-Williams, 2016), and the fourth objective in the Lebanese general objectives for Mathematics" (Official newspaper, 1997.p. 228-289). Therefore, if children are to become confident and competent mathematicians, the development of written symbolism must be accompanied by the development of mathematical language. Indeed, many mathematics educators believe that it is important that children express their mathematical thinking in language, through talk, before they begin to represent it on paper. James (1985) reviews the evidence of Bruner on the interrelationship between language and thought, and propounds a mathematics teaching procedure which he terms "do, talk, and record" (p 33).

Moreover, communication includes speaking and listening, as well as reading and writing. It enables students to not only share ideas, but also to clarify their understanding. "Reflection and communication are intertwined processes in mathematics learning." (NCTM, 2000, p.61). The use of classroom discussion as a means to make sense of the mathematics lesson taught is essential for the learning of all students and particularly for English language learners (ELL) who need to engage in productive language (writing and speaking) as well as receptive language (listening and reading) (Cirillo, Steele, Otten, Herbel-Eisenmann, McAneny, & Riser, 2014).

2.2.1 Writing to Learn Mathematics. Students always write in mathematics class. They write answers! But writing to learn mathematics means much more than the physical act of forming numbers or letters on paper. The writing process involves composing, expressing, and communicating ideas. (Edwards, 2005). Writing is a powerful learning tool and is needed to solve word problems. Trying to explain a concept to someone, clarifies it in our own mind. In the same way, writing strengthens students' understanding. Therefore, learning to formulate ideas and express them clearly in words and symbols is fundamental to learning mathematics and solving word problems (Ivic, 1994).

2.2.2 Metacognition in Reading Mathematics. Students need to be taught to use metacognition in mathematics classes. They need to become aware of when they do not understand a problem, so that they learn to pause and study it more thoroughly before reading further. Decision making is a type of thinking. We can say that students are using metacognition in solving word problems when they respond with the thoughts that influenced their decisions (Zimmerman, 1995).

Hence, reading and writing are important in communicating mathematics concepts, especially problem-solving. Even more significantly, they are vital to understanding mathematical problems and both involve organizing, clarifying, and revising ideas (Edwards, 2005). Understanding a problem is identified by Polya (1973) as the first step to solve any word problem. In this step, students must clearly know what the question means, and what they are looking for to answer.

2.3 Problem Solving Strategies

Van De Walle, Karp, & Bay-Williams (2016) advise teachers not to take the problem-solving out of problem-solving by telling students the strategy they should pick and how to do it. Instead, they recommend posing a problem that lends itself to different ways of thinking and allow students to approach the problem in a way that makes the most sense and is best supported by their own reasoning because "mathematical problem-solving is founded in curiosity" (Van De Walle, Karp, & Bay-Williams, 2016 - p 59). Therefore, students select or design a strategy as they devise a plan (Pólya's step 2). To illustrate, in his book *How to Solve It*, Polya (1973) suggests four steps to problem solving: (1) understanding the problem, (2) devising a plan, (3) carrying out the plan, (4) looking back, for increasing motivation and the promotion of successful thinking habits in students. Moreover, the literature states that solution methods which are used for non-routine problems can be classified and named based on their common properties. The most outstanding strategies among them are: look for a pattern, make a systematic list, work backwards, guess and check, draw a diagram, simplify the problem, make a table, eliminate the possibilities, estimation and reasoning (Altun, Bintas, Yazgan & Arslan, 2004).

2.4 Students Perceptions and Difficulties in Problem Solving

A visit to the literature shows that there are different aspects to students' difficulties in mathematics problem-solving. For example, the difficulty could be in understanding and retrieving concepts, formulas, facts and procedure (Zahrah et al.' (2003) as cited in Tambychik & Meerah, 2010). It could also be due to a lack in the students' ability to visualize mathematics problems and concepts (Tambychik,& Meerah, 2010), or weakness in understanding concepts, logic-thinking and lack of strategic knowledge which cause errors in problem-solving (Heong, 2005 & Latha, 2007) (as cited in Tambychik,& Meerah (2010). Moreover, Mohd Johan (2002) (as cited in Tambychik, Meerah & Aziz, 2010) states that many students could not bring meaning to the problems and did not know how to plan and perform the problem-solving strategies.

According to Tambychik, T., & Meerah, T. S. M (2010), the reasons why students misunderstand a problem varies among students. They might have difficulties in understanding the language, the mathematical terms used or making a connection to the problem. The longer time needed to understand questions results in a longer time to solve problems. Thus, students might not have enough time to solve all the problems in the time frame given. Concerning the language difficulty, it was found that students in primary schools lacked understanding of terms whereas, respondents in secondary schools lacked understanding of the mathematical language (Geary, 2004).

Apart from understanding the problems, Tambychik & Meerah (2010) found that the students faced difficulties in making decisions on how to solve the problems. Often, when the respondents had understood the problems, they still could not solve the problems. They faced difficulty in making a connection with the problems. This difficulty might be due to the deficits in number fact skill and information skill. A lack in these skills might lead to incompatible planning. According to Garnett (1998) and Nathan et al. (2002) (as cited in Tambychik, Meerah & Aziz, 2010), difficulty in making meaningful connections, inability to easily connect and transfer conceptual aspects of mathematics to the knowledge, and incomplete mastery of number fact might lead to various kinds of mathematics skills difficulties. Since the process is hierarchal, the obstacles in the first phase cause failure in other phases.

According to Stendall (2009), the abilities to concentrate, to make meaningful perceptions, to think logically and to use memory effectively are important factors in learning skills and solving problems. In addition, these skills could be learned and trained. If teachers understand the students' difficulties, they could make a change towards creating a meaningful learning based on students' intellectual needs. Since learning is stratified, there is a need to tackle students perceptions and difficulties in PS at early stages.

3.Purpose of the Study

This article reports on a part of a larger study that aimed to understand students' challenges and perceptions towards problem solving (PS) in Grade 4, 5, and 6 (n=558) in private schools in Tripoli- Lebanon. Thus, the current study addresses the following question:

1. What are primary students' perceptions toward mathematical problem solving.
2. What type of challenges primary students face when solving mathematical problems that hinder them from acquiring problem solving skills?

4.Methodology

This section of the article describes the methodology used in carrying out this part of the original study.

4.1 Research Design

This part of the study reported in this article adopted the descriptive design to investigate Cycle Two (G4-G5-G6) students' perceptions about problem solving.

4.2 Sample of the Study

The study was conducted in five private schools in North of Lebanon (School A, B, C, D, and D). The five schools were chosen to participate in the study according to the following specific criteria:(a) were private, (b) had more than six hundred students (c) served students middle and upper- middle classes, (d) used English in teaching mathematics, and (e) instructed both genders in same classroom. The purpose was also to identify to whom the study findings might generalize (Graham & Harris, 2014). All intact 21 sections of Grade 4, Grade 5, and Grade 6 answered the same questionnaire. The sample size for the present study consisted of 558 Cycle Two students. Prior to the study, a pilot study was conducted to assure the validity and reliability of the instrument used. All students' names were coded to maintain confidentiality.

4.3 Instruments

After being reviewed by experts in the field, the 10-item students 'questionnaire was first piloted for its readability by nine students from Cycle Two. Gay (2012) suggests conducting a *small- scale* trial of a study before a *full-scale* study (p.121). The students were chosen randomly with respect to their general averages, so there were average, high-average, and low-average students from each grade level. They were from a distinct group of students who participated in the study, yet they were similar to them in terms of being in English speaking private schools in the North where students came from various socio-economic backgrounds. Since they were a distinct group, they would not contaminate the ultimate study population, as recommended by Creswell (2014). In response to their comments, few terms were replaced with simpler ones.

Then the questionnaire was piloted for its coefficient of internal consistency or reliability by using SPSS program. Thirty students (ten students from each grade level) were randomly chosen by picking from a bowl of names (Table 1). Cronbach's Alpha (Table 2) was found to be 0.77 suggesting that the items had relatively acceptable internal consistency. The results were satisfactory due to the small number of questions (7 items) in the questionnaire.

Table 1. Case Processing Summary

Cases	N	%
Valid	30	100.0
Excluded[a]	0	.0
Total	30	100.0

Table 2. Reliability Statistics

Cronbach's Alpha	N of Items
.772	7

4.4 Data Collection Procedures

During the mathematics periods and in the presence of the mathematics coordinators and teachers, the students responded to the questionnaire. They were informed that the participation in the study was voluntary and their names were replaced by numbers as appeared on the students' lists of names in their schools.

4.5 Data Analysis Procedures

The questionnaire data for all participants was analyzed and summarized through descriptive statistics. This included the calculation of means, and percentages through the use of Excel.

5.Results

5.1. Number and Gender of Participants

A total of 558 students (Table 3) took the questionnaire from the five participating schools of which an average of 54% were boys and 46% were girls (Table 4).

Table 3. Number of Participants

Schools	Grade Four	Grade Five	Grade Six	Total
School A	52	48	46	146
School B	68	64	54	186
School C	36	53	33	122
School D	11	8	8	27
School E	29	32	16	77
Total	196	205	157	558

Although the number of boys, in general, seemed to slightly exceed the number of girls, the percentages differed among grade levels in all schools. As shown in Table 4, the number of boys exceeded the number of girls in all school except in School E. Yet the difference in the percentages between boys and girls in all schools was +/_ 10%.

Table 4. Students' Gender

Schools	Male	Percentage	Female	Percentage	Total
School A	77	53%	69	47%	146
School B	99	53%	87	47%	186
School C	72	59%	50	41%	122
School D	16	59%	11	41%	27
School E	35	45%	42	56%	77
Total	299	54%	259	46%	558

To understand students' difficulty in PS the researcher analyzed students' answers question by question starting with the third question. The students were given clear directions in the questionnaire to choose only one answer: "*circle the letter of your best choice*".

5.2 Question Three: Do You Find Difficulty in Problem Solving?

When asked about finding difficulties in problem-solving, three hundred eighty-five out of five hundred fifty-eight students (69%) affirmed having sometimes difficulties in PS (Table 5) while one hundred thirty-four students (24%) claimed having no difficulties at all, and thirty-nine students (7%) stated always having difficulties in problem-solving.

Table 5. Difficulties in PS Q3- Do You Find Difficulties in PS?

	Yes	No	Sometimes	Total
Total	39	134	385	558
% Within Grade	7.0%	24.0%	69.0%	100.0%

A look at the grade levels to see in which grade the students found PS easy to solve (Table 6) showed that 23.4 % of Grade Four students, 24.8 % of Grade Five students, and 23.5% of Grade Six students, almost similar percentages, had no difficulties in PS.

Table 6. Difficulties in PS. Q3- Do You Find Difficulties in PS? NO

	Grade 4	Grade 5	Grade 6	Total
Number of students who answered NO	46	51	37	134
% within Grade	23.4%	24.8%	23.5%	24%
Total number of students	196	205	157	558

To probe into students' understanding of the rationale for doing PS in mathematics, students were asked about the reason for learning PS in Question 4 (Table 7).

5.3 Question Four: Why Do You Learn Problem Solving?

Four hundred seventy-nine students in the five schools and in all grade levels (86.5%) seemed to understand the rationale behind learning PS as shown in Table 7. The total number of students in each question represents the total number of students who answered that question.

Table 7. Q4- Why Do You Learn Problem Solving?

To learn how to solve problems in general	Because they are in the math book	To get grades	I don't know	Total
479	14	38	23	554
86.5%	2.5%	6.9%	4.2%	100.0%

To probe into students' responses towards the rational of doing PS, Table 8 shows the detailed percentages of choosing answer (a): "to learn how to solve problems in general." These ranged between 78.1% in Grade 5 of School B to 96.2% in Grade 5 of School C, and the total averages for Grade 4, Grade 5, and Grade 6 were 84.6%, 84.8%, and 88.5% respectively which shows that students in the five schools were equally aware of the rationale of learning PS.

Table 8. Question 4- Why Do We Learn Problem Solving? To Learn to Solve Problems in General

	Grade 4	**Grade 5**	**Grade 6**
School A	46	39	41
% within Grade	88.5%	84.8%	91.1%
School B	61	50	48
% within Grade	89.7%	78.1%	88.9%
School C	34	50	29
% within Grade	94.4%	96.2%	87.9%
School D	1	7	7
% within Grade	9.1%	87.5%	87.5%
School E	24	28	14
% within Grade	82.8%	87.5%	87.5%
Total	166	174	139
% within Grade	84.6%	84.8%	88.5%

We learned from Q3 and Q4 that although 86.5% of Cycle Two students were aware of the rationale behind solving mathematical problems, 76% (69% + 7%) of them found difficulties in PS and this is a high percentage that encouraged the researcher to continue and probe into Q5 to know what could be the difficulties students were facing.

5.4 Question Five: What Do You Find Hard in Problem Solving?

The aim of this question was to understand what students considered hard in PS. The question offered the students five alternatives to choose from (Table 9).

Table 9. Q5- What Do You Find Hard in Problem Solving?

	Understanding some words in the problem	**Thinking of a way to solve the problem**	**Doing the calculations**	**I don't know**	**Nothing, it is easy**	**Total**
Total	103	257	45	23	128	556
Percentage	18.5%	46.2%	8.1%	4.1%	23.0%	100.0%

Two hundred fifty-seven students (46.2%) thought that "thinking of a way to solve the problem" was the hardest part. One hundred twenty-eight students (23%) found PS "easy" which was consistent with their answer in Q3 (24%) about not having difficulties in PS.

The role of language as a factor in the difficulty of PS, was chosen by one hundred three students (18.5%), while only forty-five students (8.1%) out of five hundred fifty-six students who answered this question thought that doing the calculations was the hardest part.

Table 10. Question 5- What Do You Find Hard in PS?

a) Understanding some words in the problem			
	Grade 4	**Grade 5**	**Grade 6**
School A	15	4	3
% within Grade	28.8%	8.5%	6.5%
School B	13	13	7
% within Grade	19.1%	20.3%	13.0%
School C	14	8	11
% within Grade	38.9%	15.1%	34.4%
School D	2	2	2
% within Grade	18.2%	25.0%	25.0%
School E	3	2	4
% within Grade	10.3%	6.3%	25.0%
Total	47	29	27
% within Grade	23.9%	16.6%	19.4%

To probe deeper into the grade levels (Table 10) we notice that in some sections the number of students who chose "understanding some words in the problem" as the main difficulty was above the average, which was 18.5% (Table 9). For example: in Grade Six 34.4%, 25%, and 25% in Schools C, D, and E respectively; and in Grade Four 28.8% and 38.9% in Schools A and C respectively.

Whereas for the students who chose "thinking of a way to solve the problem" as the main difficulty (Table 11), some sections of some grade levels responses exceeded the average (46.2%). For example, in School A: Grade Five (55.3%) and Grade Six (76.1%); and in School B: Grade Four (51.5%), Grades Five (50%) and Grade Six (57.4%).

Table 11. Question 5- What Do You Find Hard in PS?

b) Thinking of a way to solve the problem			
	Grade 4	**Grade 5**	**Grade 6**
School A	21	26	35
% within Grade	40.4%	55.3%	76.1%
School B	35	32	31
% within Grade	51.5%	50.0%	57.4%
School C	9	23	9
% within Grade	25.0%	43.4%	28.1%
School D	1	3	3
% within Grade	9.1%	37.5%	37.5%
School E	9	13	7
% within Grade	31.0%	40.6%	43.8%
Total	75	97	85
% within Grade	38.2%	55%	61.1%

Based on the students' responses, the researcher found that 86.5% of Cycle Two students had positive perceptions toward learning math, as they were aware of the purpose of learning PS. Moreover, 76% of the students in Cycle Two who participated in this study had difficulties in PS. The main difficulty as chosen by 46.2% of the students was about thinking of a way to solve problems followed by 18.5% as difficulty in understanding the meaning of some words which is the first step in solving any word problems according to Polya (Polya,1957); in addition to 8.1% of students who had difficulty in calculations.

6. Discussion and Interpretation

As stated earlier, the results reported in this article were part of a larger study, and they were related to the research question which investigated students' perceptions about mathematics problem solving.

The students' responses to the three questions in the students' questionnaires about students 'perceptions toward learning math and the difficulties they faced in solving word problems were similar in the three grade levels; Grade Four (23.4%), Grade Five (24.8%) and Grade Six (23.4%) of the students found PS easy to solve (Table 6); which is about a quarter of the students in Cycle Two. This implied that about three quarters of the students faced difficulties in PS in the three grade levels. And the two main difficulties selected by the students were language and analytical skills.

6.1 Difficulty in Language

The findings revealed that 86.5% of the students recognized the purpose of leaning PS and perceived its importance in solving problems in general. However, the researcher did not expect the percentages of the students in G6 to exceed those of G5 with respect to the difficulty in understanding the meaning of words or in the analytical skills because it contradicts Piaget's developmental theory where understanding develops alongside maturation (Piaget 1976). Although the older the students get, the more command they are expected to have over language (Egan 1997), the results showed that this difficulty persisted in higher grades. According to the students' responses, G6 students (19.4%) who considered understanding some words in the problem as a barrier in solving word problems exceeded those of G5 (16.6%) (Table 10), but both were less than G4 (23.9%).

Students difficulties in understanding word problems were confirmed in the study conducted by Tambychik, T., & Meerah, T. S. M. (2010). The relationship between language development and communication was highlighted by Vygotsky's *Sociocultural Theory* where language development is perceived as a process which begins through social contact with others and then gradually moves inwards through a series of transitional stages towards the development of inner speech (Vygotsky et al, 1929). These difficulties that are common among the students who participated in the current study and in previous studies could be due to the fact that students were not given ample time to experience equilibrium (Piaget 1976) through reflective thinking, or students did not practice communicating mathematically in classrooms; their teachers might have jotted the answers to save time and the students were not given the chance to construct their own meaning and understanding to the problems given.

Other studies affirm that linguistic factors affect students' ability to solve word problems, and the multi-step processes inherent in word problems can pose particular difficulties for English Language Learners (Abedi & Lord, 2001; Beal, Adams & Cohen, 2010; Dokter, Aarts, Kurvers, Ros & Kroon ,2017; Driver & Powell 2017; Durkin & Shire, 1991; Linquanti & Cook, 2013; Musanti, Celedón-Pattichis & Marshall, 2009; Verschaffel, Greer & De Corte. 2000; Wolf & Leon, 2009).

Therefore, the role of language is crucial in learning, because language is at the heart of all understanding. Intellectual development could be said to be dependent on a person's ability to use tools such as language effectively in different learning settings (Bruner, 1966; Vygotsky, 1962; Egan, 1997; Edwards, 2005). For Polya (1957), understanding the problem and the meaning of the words used is the first step in solving any word problem. Students who do not clearly know what the question means, what they are looking for, or what the key points and context of the problem are, will not be able to figure out its solution. This implies that the teachers, of the students who participated in these studies, might not have asked their students to paraphrase the context of the mathematical problem to ensure their understanding of the problem, hence be able to move to the next stage of PS

Moreover, Lebanese Scholars like Nahas (2000), Zeineddine (2000), and Jurdak (2011) stress the importance of language acquisition in understanding mathematical concepts. That is why it is expected from the Lebanese mathematics curriculum to provide particular attention to the development of mathematical language, an important component that was missing in the Lebanese textbooks used by the schools that participated in this study. It would have been very beneficial to introduce mathematics vocabulary and reinforce it through asking students to explain meanings of words and how they are used; to practice vocabulary as related to the mathematical concepts, and review meanings of words and how they are used; which gives the students the opportunity to connect vocabulary and concepts as observed in some imported textbooks. In addition to that, if teaching mathematics adopts the *teaching through the problem-solving* approach, such as IBL, reading and understanding the problem become part of learning mathematics, and not just a skill taught in isolation.

6.2 Difficulty in Analysis

In addition to the language barrier, 38% of G4 students found the main difficulty was to choose a way to solve the problem, but this percentage increased to 55% in G5 and 61% in G6. This could be due to three reasons. First, the increase of the level of difficulty of the problems themselves with the grade level. Second, the difficulties faced by students in G4 might not have been dealt with appropriately which increased the gap as they moved to higher grades. Third, students' might not have learned how to solve a problem as their teachers might not have implemented the teaching through problem solving approach which considers problem solving as the core of teaching Mathematics as every lesson starts with problem solving and ends with problem solving, where Polya's problem solving steps are inherent (Van De Walle, Karp & Bay-Williams, 2016). On the contrary they might have implemented teacher centered approach in their math classrooms

Similar results were obtained by Tambychik, T., & Meerah, T. S. M., (2010) who found that apart from understanding the problems, the students stated facing difficulties in making decisions on how to solve the problems. Often, when the respondents had understood the problems, they still could not solve the problems. This difficulty could be due to finding out what is required from the problem and selecting the appropriate problem solving strategy (as stated in the second step of Polya's model); in addition to deficits in number fact skill, information skill, and the respondents' ability to make coherent visual perceptions.

Moreover, Toom (2000) reports that teacher-centered methods do not promote understanding; in fact, other methods of teaching are needed. They highlight the need for more interactive strategies to help students in doing mathematics word problems. Unfortunately, the Lebanese mathematics curriculum, as manifested in the Lebanese textbooks, lacked teaching students the various strategies to approach problem-solving, and did not provide questions that promote students' metacognitive skills. Problem-solving came at the end of the teaching session, as a context of application of the facts presented or training in the algorithms taught (Osta, 2003). It also lacked activities that engage students in planning how to solve a problem, monitoring their thinking by periodic assessment, and reflecting through writing in mathematics. There was a reluctance towards the use of real-life situations Osta (2003). Mahfoud (2023) also reported that secondary students are not able to think logically; they rely on memorization to solve problems, and when students are confronted with a new problem they do not know how to solve it.

These findings match with the coordinators and teachers' claim about the role of language, students' analytical skills (Amanatallah & Moukarzel, 2018), and the need for new strategies to teach students how to learn, how to monitor their thinking, and how to express their idea orally and in writing (Amanatallah & Safa, 2021). By teaching students such strategies of thinking, they can enter into unfamiliar and novel tasks (Van De Walle, Karp & Bay-Williams, 2016).

Such finding were emphasized in other studies on students' difficulties in PS (Bernado & Calleja, 2005; Hairol, Mohammad & Shahrill, 2014) showed that foreign language is not the main barrier for students to solve word problems. For them, there exists a weak correlation between the command of English and the ability to solve word problems; language is a necessary condition for developing problem-solving skills, but it is not sufficient: "*Good English is only necessary to solve Wordy questions (more than 40 words). Maybe, the reason is not on language but perhaps it is actually the teaching and learning that needs to be modified*" (Hairol, Mohammad & Shahrill, 2014; p-9); hence they proved that students did not require good English to do mathematics word problems questions with less than 40 words, but they needed strategies in order to help them solve problems. Such results also highlight the rationale of teaching students the problem-solving strategies, mentioned earlier, such as look for a pattern, make a systematic list, work backwards, guess and check, draw a diagram, simplify the problem, make a table, eliminate the possibilities, estimate, and reason; from which the students can select a strategy or design a plan to solve a given problem.

7.Limitations

The limitations of a study are boundaries that the researcher cannot control (Perry,1998). The limitation was due to the selection of private schools that used English as the means of instruction and had more than 600 students. In that regards, the findings of this study could be generalized to schools that have the same characteristics of the schools included in this study.

8. Implications for Practice

Based on the findings the researcher suggests that writing become a routine in mathematics classes by asking students to explain their thinking in writing because writing strengthens students' understanding, and the value of writing mathematics lies not in the finished product, but in the process itself. For Edwards (2005), writing is one form of doing mathematics, and students' writings give us a window into students' thinking. In addition to that it is recommended to teach students strategies to solve problems. Strategies such as look for a pattern, make a systematic list, work backwards, guess and check, draw a diagram, simplify the problem, make a table, eliminate the possibilities, estimate, and reason is empowers students. For this reason, the researcher recommends the textbook publishers embed those strategies along with Polya's steps in mathematics textbooks. However, teaching students those strategies is necessary, but it is not sufficient. We need to support teachers with teachers' guides that include active learning strategies which could help them in teaching problem-solving to students; and textbook publishers could play a helpful role in this regard.

9. Conclusion and Recommendation for Future Research.

This study was a pioneer in investigating students' perceptions about PS at Cycle Two in North Lebanon. The results showed that up till now, about three quarters of Cycle Two students perceive PS as a difficult task.

First, it is recommended to conduct this research on another sample representative of the population, i.e., a sample which includes different private schools taken from different geographical areas. And then on a larger scale which includes private and public schools, where the language of instruction is Arabic, English or French in order to test and compare other factors that might affect students' perceptions about problem solving.

Second, it is recommended to conduct case studies in various schools to be able to observe students when solving mathematics problems and make interviews with them and probe their difficulties in problem-solving.

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Interviews
Nehme Mahfoud (Mathematics secondary teacher) (Call interview) July 25, 2023 @ 10:00

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