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Applying Problem Solving Approach in Teaching Addition and Subtraction Word Problems in Diverse Grade 3 Classrooms

Tinyiko Florence Sambo[a] & Tšhegofatšo Phuti Makgakga*[b]

* Corresponding author
Email: makgatp@unisa.ac.za

a. Department of Mathematics Education, College of Education University of South Africa, Pretoria South Africa.

b. Department of Mathematics Education, College of Education University of South Africa, South Africa.

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ABSTRACT

Word problem solving is an approach that can increase knowledge, improve performance and develop learners' critical thinking skills that can assist them in solving mathematical and real-life problems. This study examined the effectiveness of using a word problem solving approach to improve Grade 3 learners' performance when learning addition and subtraction. The study employed this hypothesis to test the difference between the experimental and control groups and between the pre-test and post-test with learners in diverse classrooms solving addition and subtraction word problems. A pre-test-intervention-post-test research design was used to collect the data. Baseline lesson observations and unstructured interviews were conducted to understand the effectiveness of the problem-solving approach in teaching number concepts, problems, addition and subtraction. The results of the study revealed a significant difference between the experimental and comparison groups when solving addition and subtraction word problems. Furthermore, there was a significant difference between the pre-test and the post-test in the experimental group. It was concluded that word problems could be taught by following steps for problem solving and equipping learners with essential reading skills to help them comprehend what they are reading. The interviews showed that teachers do not have enough time for learners who experience learning challenges and reading in particular in pursuit of covering the curriculum. Learners in the foundation phase must be taught money problems and problem-solving skills to acquire knowledge to be used in higher grades and real-life situations.

KEYWORDS

Addition; diversity; problem solving approach; learner performance; subtraction; word problems.

INTRODUCTION

Word problem solving is an approach that can increase learners' knowledge and develop thinking skills that allow them to solve mathematical and real-life problems. Csíkos and Szitányi (2019) reason that teaching solving mathematical word problems should begin as soon as learners start learning in the first grade. Most learners can solve mathematical problems that do not require critical thinking. Kurshumlia and Vula (2013) argue that learners should be able to solve problems that encourage logical thinking, allowing them to solve word problems in real-life situations or where they are presented. However, most learners have shown difficulties in solving mathematical word problems and need guidance and support to overcome the problem.

Studies have been conducted on the difficulties learners face when solving addition and subtraction word problems (for example, Andini & Suryadi, 2017; Pratiwi et al., 2019; Sidik et al., 2021). Clements and Sarama (2003) and Pratiwi et al. (2019) found those difficulties as problem understanding, generalising patterns, analysing patterns and functions, displaying problem situations with items, using representations, and limited technical and conceptual understanding. Teachers should know the learners' strengths, weaknesses, thinking and understanding level, learning abilities, attitude and academic background (Dayal & Chandra, 2016). McDonald and Banes (2017) argue that learners should interact with the word problem to understand real-life problems.

A problem is any action in which learners have no specified or learned procedures or practices, nor do they have an awareness that there is a particular suitable result technique (Hiebert et al., 1997 in Van de Walle, Karp, & Bya-Williams, 2014). For Dofková and Surá (2021), word problems may be recognised as real-world challenges with an actual framework comprising a problematic idea that can be resolved using accurate means. For the learners to construct concepts and understand or connect the new knowledge with old knowledge, they need to perceive, trace, listen or have opinions (Van de Walle, Karp, & Bya-Williams, 2014).

The mathematical content of word problems in South Africa (SA) is introduced in Grade 3, the exit grade in the Foundation Phase (FP). It is essential to equip learners with mathematical problem solving skills before entering the Intermediate Phase (IP), which starts in Grade 4. Lesh et al. (2013) claim that the learners' abilities to learn and solve problems tend to be influenced by their prior knowledge and what they can do. Likewise, Khoshaim (2020) indicates that most learners lack skills from the previous grades or bring the wrong skills for solving word problems, which hampers the learning process. Hence, mastering the basic skills of solving word problems is vital for Grade 3 learners. For them to be able to learn relevant ideas and to solve relevant problems. In this study, we intended to uncover how teachers in Grade 3 diversity classrooms use word problems to teach number concepts in relation to addition and subtraction word problems.

In this study, Polya's steps of problem solving were used to facilitate learners' understanding of how to solve addition and subtraction of word problems in money problems. There is a shortage of studies on addition and subtraction of word problems and solving money

problems in Grade 3. Olkun and Toluk (n.d.:2) examined whether word problems representing different meanings of addition and subtraction were sufficiently incorporated in elementary mathematics textbooks in Turkey. Suseelan et al. (2022) assessed the mistakes made by underperforming learners in various national primary schools in Malaysia when solving word problems requiring creative thinking skills. Sidik et al. (2021) investigated Grade 3 learners' obstacles when solving addition and subtraction problems in Indonesia. Research in Grade 3 word problems focusing on addition and subtraction of word problems is essential since word problem solving is introduced at this grade. Also, this can assist in laying a solid foundation for learners before they go to the IP.

The aim of this study was to examine the effectiveness of the word problem solving approach in teaching addition and subtraction in Grade 3 diverse classrooms. This study sought to test the following hypotheses to examine the effectiveness of using word problem solving.

H_0: The word problem solving approach has no significant difference between the experimental and control groups in the performance of Grade 3 learners when teaching addition and subtraction.

$H_{1:}$ The word problem solving approach significantly differs between the experimental group and the control group in the performance of Grade 3 learners when teaching addition and subtraction.

THEORETICAL PERSPECTIVES

The notion of problem solving

Polya (1957) introduced the four steps that could be used to solve mathematical word problems. The author argues that the four steps include understanding the problem, devising a plan, carrying out a plan and reflection.

Step 1: Understanding the Problem

According to Polya (1957), when solving word problems, learners should do the following to understand the problem: They should try to comprehend the problem by identifying the main problem of the provided question. They should also identify what they know about the problem and what they do not know. Learners can use drawings or pictures to help them understand the problem or identify the given information and the unknown answer to the problem. NCTM (2000) suggests that learners can familiarise themselves with the problem by rereading it to understand it. Polya (1962) argues that teachers should ask questions to understand what is happening in the learners' minds. Furthermore, the (ibid) argues that different ways of asking the same question could attract the learner's attention or focus to the unknown, asking them to think of the recognisable problem as having a like or the equivalent unknown. These will help learners to understand the problem and figure out how to solve it.

Step 2: Devise a Plan

Polya (1957) reasons that learners should try to find the relationship between the provided and unidentified information. Learners can look for familiar details to help them solve the problem.

They can familiarise themselves with the question by identifying the given numbers from the problem, using drawings to understand the problem or thinking of a related problem they have already solved. Kingsdorf and Krawe (2016) proclaim that teachers need to teach learners to recognise patterns in problems and associate that problem with a previously learnt category. NCTM (2000) argues that teachers should introduce different strategies for solving problems for learners. Hence, the teachers should know each learner's strengths, limitations, level of thinking and understanding, the structure of their learning, attitude and academic background (Dayal & Chandra, 2016).

Step 3: Carry out the Plan

In this step, Polya indicates that the strategy for solving the problem identified in step 2 should be applied. However, if the strategy is not working, the learner should return to step 2 and change it.

Step 4: Reflection

One section from Step 4 is to find a way to verify if the solution to the problem is correct or not, if possible, use a different process in solving the problem. This step can be applied by asking learners to use the reverse operation of addition, which is subtraction, to check if the answer is correct. For example, suppose learners were asked to find the change a person will get when paying a bigger/larger amount. In that case, the learners can add the change and the total amount paid to see if they get the original amount that the person had before purchasing the items. Another part of step 4 is evaluating the method used to solve the problem. Was it efficient? Are there approaches that could be used to make it more efficient? Can the techniques be applied to other kinds of problems?

RELATED LITERATURE

Different researchers have investigated teaching word problems in mathematics. Pongsakdi et al. (2016) studied the effectiveness of the developed world problem enrichment program on the learners' problem solving performance. The (ibid) found that straightforward strategies cannot solve word problems, however, learners need to have a deeper understanding of the context of the word problems to solve them correctly. Similarly, Francia and Dela Cruz (2021) found that many learners get stuck when solving word problems because they lack a proper understanding of the necessary concepts. As such, teachers should develop learners reading skills and knowledge that will help them understand when reading the questions on word problems. According to Polya (1957), the teacher should assist learners. However, the assistance should neither be too little nor too much so the learner can have a realistic share of the work. The teacher can accommodate and support learners with different thinking levels by making neutral comments or posing follow-up questions (Steyn & Adendorff, 2020).

Reading with understanding is crucial so learners do not miss important information for solving the problem. Kurshumlia and Vula (2013) present that misunderstanding particular words creates inappropriate application of mathematical operations in solving the problem.

Bolton Council (n.d.) proclaims that if learners cannot read for comprehension, they cannot solve the problem. Francia and Dela Cruz (2021) argue that to overcome a word problem, learners should read the problem, identify the vital material, resolve the problem and reflect on how the response makes sense. However, Akina et al. (2021) argue that learners' understanding is determined by the language construction used in formulating the mathematical word problems. The (ibid) further states that teachers should compile the word problems based on the learners' grade level, which meets the criteria of good word problems. This shows that reading with understanding is important for learners to solve word problems.

Powell and Fuchs (2018) suggest that the learners should first attempt the problem by reading to interpret the meaning, then recognise the question and identify the type of the problem. This implies that the learner should understand what the question is all about. Nevertheless, if learners' reading skills are not good, they'll fail to grasp important information, use the correct operation and follow the procedures for solving the problem (Unson, 2021). Bolton Council (n.d.) suggest that learners can be encouraged to underline the most important information while reading the problem to develop reading with understanding. This might assist learners in identifying the mathematical operation to be used for solving the problem.

Moleko and Mosemege (2020) claim that the lack of mathematical vocabulary creates challenges in teaching and learning word problems. Learners need to be exposed to mathematical vocabulary so that they do not experience difficulties when reading the questions. Francia and Dela Cruz (2021) maintain that some learners find word problems confusing, containing extra words, numbers and descriptions that seem irrelevant to the questions. Suppose learners know the meaning of mathematical terms. In that case, they can learn mathematical concepts and develop the necessary skills in mathematics, which will enable them to solve word problems and other problems in mathematics.

Khoshaim (2020) proclaims that teaching the implementation of route procedures or showing learners the effectiveness of using mathematics to address everyday challenges is essential. Solving mathematical problems will enable the learners to solve related real-life problems. Powell and Fuchs (2018) maintain that the problem should be attacked by finding the missing information by providing a number sentence or using pictures and checking whether the answer makes sense. Similarly, Bolton (n.d.) supports using drawings and pictures in diverse classrooms when solving word problems, as this assists learners in establishing relations from the explanation to find the solution.

Diversity is embraced and acknowledged worldwide because it encourages people from different backgrounds who speak different languages, are of different races, etc., to live harmoniously. The education system of South Africa (SA) started to recognise diversity in schools after 1994. The Department of Basic Education (DBE) (2011) outlines diversity as learners who speak different languages, come from different backgrounds, are of other races, gender, religions, ethnicities, abilities, sexual orientations, etc., and learn together. Teachers with varying teaching skills to support diversity in the classroom are required (Davin, 2013).

White paper 6 emphasises that every learner needs support since learners experience learning difficulties. Baglieri and Shapiro (2017) claim that the teacher's ability to differentiate the learning abilities of learners in a diverse classroom allows her to modify the techniques and teaching resources to support and accommodate every learner. Therefore, diversity in the classroom will enable learners to receive equal and similar education, irrespective of the language, social and financial background, or culture (DBE, 2014).

METHODOLOGY

Research method

This article adopted the mixed method approach within a non-equivalent pre-test-intervention-post-test design to provide treatment to one group and withhold it to another group (Creswell & Plano Clark, 2018). This aimed to test the hypothesis and check whether the outcomes confirmed the null hypothesis or the alternative hypothesis. The pre-test-post-test design with a non-random control group was employed since data was collected from the comparison group at the same time as the experimental group (Gray et al., 2017). The experimental group in this study was a school where the intervention strategy was applied, whereas the control group was the school where the intervention strategy was not used. Two schools with similar performance were selected to see if the intervention could yield better results in learners' performance.

The problem solving approach as an intervention strategy was immediately implemented in the experimental group after administering both groups' pre-test and script marking. Then, the intervention strategy was implemented in the experimental group, and after a specific period, the post-test was administered to both groups. The intervention followed the understanding of the word problems, analysis of the word problems by breaking them into smaller chunks, execution of the word problems and reflection of the word problems. The intervention took four weeks to complete and was implemented twice a week in the experimental school prior to the post-test administered.

The same test instrument was used for both pre-test and post-tests at the study's start and conclusion. The test was comprised of seven questions randomly selected from the previous grade 3 question papers that were provided with lesson plans and verified by the teachers. The question paper was written in Sepedi because learners in the FP learn mathematics in the vernacular. The interval between the pre-test and the post-test sessions might have been enough for the learners not to remember the questions and to know the answers to the pre-test (Gray et al., 2017). In this study, the experimental learners received the intervention. Meanwhile, the control learners received the standard teaching, hence, the achievement of the experimental learners might be due to the intervention. The table below provides the structure of how the question paper looked like. However, the questions in the question paper were written in Sepedi.

Table 1.

The structure of the pre-test and post-test

Items	Meaning
1.1 Tshepo bought a cake at R30.95 and 2 litre of juice at R22, 99. How much did he pay altogether? (2) 1.2 Lerato wants to buy a loaf of bread at R17.99, sugar at R35.50 and a packet of tea at R40, 99. How much will she pay for them all? (2)	The question required learners to add the total amount of the items.
2.1 Jabu bought a chocolate, a packet of chips, six rolls and cheese at R87. 95. If he paid with R100.00, how much was his change? (2) 2.2 Johanna has R50.00 and what to buy muffins for her friend as a gift for birthday. She buys muffins at R35.89. How much is much money is left? (2)	The question assessed whether learners could be able to do subtract the amount paid from original amount.
3.1 Lebo bought a cool drink at R23.95 and a buns at R8.95. How much did she pay? If pays with R50.00, how much change will she get? (3) 3.2 Thabo wants to buy a gift for his friend. He only have R38.45 and the gift cost R60.95. How much more does he needs to buy the gift? (3) 3.3 Thato bought juice R10.95, bread at R19.80, chocolate for R7.95 and milk for R9.95. How much did she pay? How much was her change after paying with R100.00? (3)	The question assessed learners' knowledge on using addition and subtraction in one question to find the answer

The participants who wrote the pre-test for the study were 131 Grade 3 learners (experimental group = 57 and control group = 74); for the post-test (experimental group = 55 and control group 68), some of the learners were absent during the post-test and two (2) teachers from the participating schools. The Grade 3 learners needed to be prepared for subsequent Grade 4.

Purposive sampling was used as the schools possess the characteristics the researcher sought (Cohen et al. 2018). The two (2) teachers were teaching Grade 3 classes and had

experience teaching diverse classrooms in the FP. A teacher and 49 learners took part in the pilot study.

Data collection and analysis

Lesson observations, discussions and planning and interview were used in the study to understand the scope of the activities in one (1) Grade 3 classroom. Data was collected during the baseline observation, pre-test and post-test and unstructured interviews. Teachers' word problem solving in addition and subtraction of money challenges found during the observation was tried to be attended to during the implementation of the intervention in the main study, with six contact sessions.

Data was organised and interpreted accordingly from FP teachers in the Nylstroom Circuit of the Waterberg district in the Limpopo province through observations, pre-and-post-tests, intervention and unstructured interviews. The researcher took the role of participant-observer. This permitted us to discuss and plan lessons with partakers on how to improve the teaching methods (Maree, 2016; McMillan & Schumacher, 2014). The teacher participants took the lead while the researcher advised where applicable.

The descriptive data analysis produced is presented in relation to the hypothesis of the research study. For pre-and-post-test data analysis, Excel was used to manage data and Stata Release 15 for statistical analysis. T-test was used to compare the two (2) study groups, the experimental and the control groups. The results were interpreted at a 95% confidence limit. In other words, the results were declared significant if the p-value was less than 0.05 or not substantial if the p-value was greater than 0.05.

FINDINGS

The results are presented in three (3) parts: The first part is the results from the baseline observation, the second part is the results from pre-and-post-tests (statistical analysis), and the results from the unstructured interview with the experimental teacher.

Baseline observation results

The researcher observed that the teacher applied the question-and-answer method prior to the intervention strategy. *The learners were asked: "Lethabo went to the shops to buy some things at the shop. She bought a loaf of bread for R15.90, a packet of sweets for R3.00 and juice for R14.80. How much did she pay altogether?* The teacher read the question to the learners and asked them to show their answers on the chalk. Even though most learners were involved in answering the questions, the teacher could not support or guide the learners who wrote the wrong answer or ask the one who wrote the correct answer how s/he worked out the answer.

She asked the whole class if the answer was correct or incorrect, then continued to the next learner. This showed that the teacher was unable to assist and accommodate the learning needs of all the learners. The teacher was only interested in the correct answer and then moved to the next question. On the contrary, Kingsdorf and Krawec (2016) explain that teachers should apply corrective, fruitful feedback and provide guided practice that is immediate and specific

while allowing independent time for solving problems. This would enable learners to have time to come up with a strategy for how to solve the problem. Likewise, Steyn and Adendorff (2020) proclaim that creating a positive mathematics inquiry classroom encourages positive learner involvement.

Statistical analysis from pre-test and post-test results

The test administered to the control and experimental groups was used as pre-test and post-tests. The time interval between the administering of the pre-test and post-test was six weeks, and it was not possible for the learners to remember the questions they wrote about in the pre-test. For this study, the researcher wanted to see if problem solving approach would improve the performance of the experimental group in addition and subtraction of word problems. The experiment and control groups were compared by employing the mean score test. The statistical interpretation was performed at a 95% confidence limit. The dependent t-test was used to check statistically the significant change in the mean of the experimental group between the pre-test and the post-test after the application of the problem solving approach after administering the pre-test. Table 2 below presents the two (2) samples of the mean score test, testing the statistical difference between the experimental and control groups.

Table 2.

Pre-test results

PRE-TEST RESULTS			
Group	**Obs**	**Mean**	**p-value**
Control	74	7.905405	
Experim	57	10.17544	0.0254
Combine	131	8.89313	
diff		-2.270033	

Table 2 above illustrates that from the pre-test, the experimental and control groups generated different significant results with the experimental group (mean = 10.17544) and the control group (mean = 7.905405), which produced the (p = 0.0254), which is less than 0.05 at 95% interval. The findings showed that the experimental group recorded a mean score greater than the control group in the pre-test, which measured the word problem solving skills. Some experimental group learners showed the necessary skills to understand and solve word problems (Pongsakdi et al., 2016).

The teaching approach applied by the teacher during the baseline observation seemed to have contributed to the performance of the experimental group in solving addition and subtraction word problems. On the contrary, the teacher's teaching approach might have affected the control group's poor performance. Moleko and Mosemege (2020) supported this and said that learners' lack of mathematical vocabulary is a challenge towards teaching and

learning word problems. Similarly, Francia and Dela Cruz (2021) present that some learners find word problems confusing, containing extra words, numbers and descriptions that seem irrelevant to the questions. This becomes a challenge to learners as they end up unable to solve word problems. Table 3 below presents the post-test outcomes after the employment of the problem solving approach.

Table 3.

Post-test results

POST-TEST RESULTS			
Group	**Obs**	**Mean**	**p-value**
Control	68	11.57353	
Experim	55	13.76364	0.0269
Combine	123	12.55285	
diff		-2.190107	

Table 3 above shows that the intervention experimental group in the post-test displayed a higher mean score than the control group when solving word problems. The outcomes depicted a statistically significant difference between the two groups. However, the control group also showed some improvement (mean score = 13.76364) higher than the control group (mean score = 11.57353) with the p-value = 0.0269 in the post-test. Learners who received the intervention seemed to have improved in solving word problems in addition and subtraction. This concurs with Pongsakdi et al. (2016:24) that straightforward strategies cannot solve word problems, but more understanding and comprehension of the background of the word problems is needed to resolve the problem. Most learners seemed to have been able to identify the keywords by underlining them or by using pictures. Learners could attack the problem by finding the absent information, providing a number sentence, using pictures, and checking whether the answer made sense (Powell & Fuchs, 2018).

Results during the application of intervention strategy

During the intervention strategy, the teacher guided learners on how to identify the keywords from the questions, unlike before the implementation, where the teacher did not guide or support the learners when providing wrong answers. During the intervention, the teacher emphasised that the learners should read the question twice or thrice and then try to understand the problem by drawing pictures and identifying keywords and numbers by underlining them. The teacher also encouraged learners to draw pictures to help them understand the problem so that they could be able to solve the problems. The learners were given worksheets with five-word problems that involved addition and subtraction about money problems. For example: "*Lebo bought a cool drink for R10.95, six eggs for R19.80, chocolate for*

R7.95 and milk for R9.95. How much did Lebo pay altogether? How much does she have after paying R100.00?."

Learners were grouped into mixed learning abilities to support each other in reading and working out the answer to the problem because most learners could not read the questions with understanding. Learners were also given the resources of money paper (pictures of different money used during teaching and learning, including the coins) to help them understand what they were doing. The teacher used the following sentences to guide the learners: 1) Interpret the question by using the pictures given.; 2) What is the question?; 3) Identify the operation to be used, write the number sentence and work out the answer. 4) Finally, use the reverse operation to check if your answer is correct. For example, if you find the answer through subtraction, add back the answer to see if you will find the given amount and vice versa.

Learners were then given the opportunity to write their answers on the chalkboard and explain how they worked them out. Some learners explained that words like "*lefela*" which means "*pay*", "*ka moka*", which means "*altogether*", "*bokae*", which means "total", "*šetše*" "left". They indicated that the words helped them to know that they should add the amounts of the items together. However, some learners forgot to add the rands carried from the cents. For example, when using the column method for R9.80, R10.95 and R9.95, some would add 5 cents and 5 cents; they would write 10 cents instead of 0 and carry 1 to the next column.

Results from unstructured interview

After administering the post-test, the researcher asked the experimental teacher questions, which is an example of how she answered.

Researcher: "How did you find the application of Polya's problem-solving steps?"

The teacher responded, "I think the steps of problem solving are good and helped *guide learners on how to answer the question. Asking them the guiding questions allowed most of them to be able to answer the problem. Some learners could identify keywords by underlining them. The problem is that most learners come to Grade 3 unable to read, and there is not enough time to focus on. The department expects us to finish the curriculum for the term, and we just rush in teaching most of the topics*."

This shows that supporting and guiding learners is imperative in helping them to understand the imparted information. At the same time, the teacher experiences challenges with learners who cannot read while also trying to finish the term's curriculum. The researcher asked the teacher: "How will you teach word problems from now onwards?"

The teacher's response: "*I will follow the problem solving steps because I can see that several learners can understand how to solve the word problem questions, unlike before*. *I will also recommend these steps to other teachers, especially during our grade meetings, because when you ask them questions to identify or underline the important information from the questions, most learners understand what is going on."* This confirms that before introducing

Polya's steps of problem solving, the teacher struggled to support or accommodate all the learners.

DISCUSSIONS

The findings from the observations prior to the introduction of problem solving approach exposed that the teacher was unable to support the learners by asking curious questions to direct them in working out the solutions. This indicated that the experimental teacher lacked the appropriate skills to guide and support the learners in a diverse classroom. On the contrary, Steyn and Adendorff (2020) posit that teachers can accommodate and support learners of different thinking levels by making neutral comments or posing follow-up questions. Likewise, Dayal and Chandra (2016) support that teachers need to know learners' strengths, weaknesses, thinking and understanding levels, learning abilities, attitudes and academic background to support or accommodate their learning needs.

The outcomes of the intervention strategy presented that the experimental teacher made an effort to use resources to ensure that the learners' learning needs were accommodated. However, some learners indicated that they could not read and/or read with understanding. Reading with understanding is critical when it comes to word problems. According to Kurshumlia and Vula (2013), reading without understanding may result in learners using the incorrect operation and being unable to solve the problem (Bolton Council, n.d.). If learners are unable to comprehend what they have read, it will not be possible for them to explain what the question is about or to solve the problem. This creates a gap in acquiring basic problem-solving skills and knowledge needed for the next grade.

On the other hand, the findings during the employment of the intervention exposed that the experimental teacher supported the learners by asking questions to guide them. This aligns with Steyn and Adendorff (2020), who state that teachers should support learners of different thinking levels by making neutral comments or posing follow-up questions. According to Polya (1957), the teacher should assist the learner, however, the assistance should neither be too little nor too much so that the learner can have a realistic share of the work. When learners are supported and guided, they may develop an interest in attempting to solve other related problems. Eventually, they may acquire problem solving skills to help them solve real-life problems.

The step of identifying important information and keywords and even using pictures helped learners become familiar with the question asked and solve it. In addition, checking if the answer was correct after solving the given question showed that learners' problem solving skills were developing. Furthermore, the employment of the materials during teaching and learning assisted them in understanding the money word problem concept. Data also revealed that some learners experience the challenge of taking cents to rands after adding the cents together. This implies that learners lack knowledge of carrying the number to the next value.

The findings further revealed that supporting or accommodating learners by asking guiding questions helps the learners to understand and answer the question. Even though there were still some learners who could not understand how to solve addition and subtraction of money problems, most of them could answer the questions correctly because they were grouped according to different abilities to support each other. Hence, those who are unable to read need support and guidance to figure out how to solve their problems. Francia and Dela Cruz (2021) maintain that learners who lack understanding of concepts necessary for solving the problem get stuck and do not know when to solve the word problems.

The results from the unstructured interview showed that the issue of time is a challenge for teachers. She did not have enough time to focus more on learners experiencing learning difficulties since she had to cover the expected curriculum of the term. This can hamper the teacher from spending enough time teaching concepts that learners are struggling with because they want to finish the curriculum. Also, this might create a learning gap in some content because the teachers will rush on teaching a particular content focusing on curriculum instead of ensuring that learners grasp and understand the content.

CONCLUSION

The study concluded that teachers need to support and accommodate all the learners by providing leading questions to assist them in understanding the problem. Knowing the different learning levels of learners will help the teacher in supporting and accommodating them during teaching and learning. The teacher was concerned about the learners who were unable to read. However, she did not have enough time to focus on learners experiencing difficulties due to the issue of covering the curriculum content. It is important that learners should be able to read with understanding to solve word problems, as this will allow them to identify keywords and therefore enable them to solve mathematical problems.

The study concludes that word problems can be better taught by following steps for problem solving and equipping learners with important reading skills that will help them comprehend what they are reading. It is important that learners should be taught money problems and problem solving skills from as early as in the FP to acquire knowledge to be used in the following grades and real-life situations.

Limitations

This study was limited to only two (2) primary schools in one (1) of the townships of the Limpopo province. The main purpose of this study was not to generalise the results but to measure the significant difference in using problem solving approach between the experimental group and comparison group and then between the pre-test and post-test results. Despite the limitations mentioned, the efficiency of problem-solving approach in teaching addition and subtraction word problems can be implemented in similar locations and backgrounds to measure the significant difference between the groups and then the pre-test and post-test results.

Ethical consideration

The researcher obtained the ethical clearance certificate from the UNISA College of Education Ethics Review Committee (No. 2020/11/11/31640036/07/AM). Approval was also attained from the Limpopo Department of Education and the principals of the two participating schools. The participants were asked to indicate their consent to participate in writing. Parents signed the consent letters to designate that they permitted their children to partake in the study, while learners signed assent letters.

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The authors declare that the data for the article are available upon request.

Disclaimer

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