

Rural Learners' Views and Perceptions about Their Experiences in Word Problem Solving

Nothile Kunene¹ and Percy Sepeng²

*North-West University (Mahikeng Campus), School for Teacher Education and Training,
Private Bag X2046, Mmabatho, 2745, South Africa*
E-mail: ¹<nothile.kunene@nwu.ac.za>, ²<percy.sepeng@nwu.ac.za>

KEYWORDS Word Problem Solving. Mathematical Language. Academic Achievement. Text Comprehension. Real Life Problems

ABSTRACT Research conducted in South African schools on word problems has provided little or no information on the reasons associated with poor academic achievement in word problem solving, except those linked to issues of reality and common sense in problem-solving processes. It is therefore against this background that the study reported in this paper sought to provide an overview of factors that are associated with poor academic achievement of primary school learners within South African classroom contexts. To do this, the study followed a qualitative approach by using a focus group discussion with a group of six Grade 6 learners. In brief, the findings of the study outlined in this paper seem to suggest that the mathematics academic achievements of Grade 6 learners in mathematics word problems solving are affected by a number of variables such as mathematical language use, text comprehension and terminology, understanding operations embedded in the text, concepts and vocabulary clarity, as well as the structure of the word problem.

INTRODUCTION

Mathematics word problems are seen by many as an opportunity to engage learners in problem solving as a key and fundamental element of learning mathematics with understanding. Furthermore, mathematics' teachers view word problems as a way to bridge a widening gap between what is formally learned and taught at school with learners' out-of-school 'informal' knowledge and experiences about the mathematics. Others use word problems in mathematics classrooms as a resource to teach learners how to model real life problems in primary mathematics classrooms (Ellion 2016; Sepeng 2014; Roberts 2016; Sepeng and Kunene 2015). Despite a call by the Department of Basic Education in a report on annual national assessment in primary school mathematics, to prioritize the teaching of word problems, South African learners continue to perform below average. However, primary school learners struggle to connect classroom mathematics with their daily activities outside mathematics classrooms. To make matters worse, school mathematics is taught in a language that is not used by learners and teachers at home, and as a result, learners' academic achievement is compromised.

Ilany and Margolin (2010) view a word problem in mathematics as an independent unit that comprises a speech event and a question sen-

tence, which is divided into two types according to the topics to which they relate. These researchers argue that there are mathematical word problems that deal with mathematical relationships between objects and those that relate to real life situations. Lave (1992), on the other hand, describes word problems as a school activity that has 'no intuitive connections with everyday experience'. Reikeras (2009) describes solving word problems as calculation tasks that are embedded in text and whose words and structure create problems are referred to as word problems. Solving word problems involves calculation tasks that are embedded in the text and whose words and structure create problems that are called word problems. Solving word problems is a process by which the learners experience the power and the usefulness of mathematics in the world around us.

Learners generally believe that mathematics is a difficult subject to learn (Aksu 2001). As early as 1992, Kenneth reported that learners appeared to like solving word problems in mathematics the least. According to Kenneth (1992), learners were afraid to attempt to solve mathematics tasks associated with word problems, and were unable to apply arithmetic operations to real life situations. Steele (2002) claims that learners struggle even more than usual with word problems and new concepts and frequently 'shut down' mentally when they see word prob-

lems because they associate these tasks with failure. Mundia (2012) also refers to the negative influence of the belief held by many people that mathematics is a difficult subject. Nevertheless, research conducted in South African schools on word problems has provided little or no information on the reasons associated with poor academic achievement in word problem solving, except those linked to exclusion of reality and common sense in problem-solving processes (see for example Sepeng and Webb 2012; Sepeng 2013, 2014; Sepeng and Kunene 2015). It is therefore against this background that the study reported in this paper sought to provide an overview of factors that are associated with poor academic achievement of primary school learners within South African classroom contexts. To do this, a qualitative approach was used through the use of focus group discussion with six Grade 6 learners.

Reikeras (2009) reported that the structure of word problems strongly influences learners' mathematics achievement regardless of age and performance in solving word problems through all grades. According to Reikeras, a process of solving word problems requires learners to sufficiently develop verbal skills in order to construct an appropriate representation of the problem. Voyer (2010) points out the factor of comprehension, which could include representations, based on the learners' real world knowledge, in particular as a factor that influences learners' performance in solving word problems. It is also argued that highly articulate learners tend to dominate classroom discussions while low academic achievers usually remain passive and even when they participate, their contributions are comparatively weaker and their ideas are sometimes muddled (Sepeng and Webb 2012). Sarmini (2009) argues that learners' difficulties and poor performance in solving mathematics word problems emanate from their linguistic type rather than the intellectual or cognitive.

The paper starts by providing an overview of the notion of classroom practices and errors made by learners when solving word problems, followed by mathematical symbols, concepts and vocabulary clarity and knowledge. Factors that affect mathematics achievement within the context of word problems in primary schools are discussed next. Issues that are associated with mathematical language and academic expecta-

tions as well as those linked to solving story problems in general are outlined. The theoretical underpinnings of the study reported here are presented within the context of South African primary schools. The author presents the methodological tools used in the study, reports the findings, discusses the results, and then provides a conclusion. Finally, recommendations are made for various practitioners in the field of mathematics education.

Text Comprehension and Terminology of Mathematics Language

The comprehension of the text in word problems is important as the language is not only the means to convey information but it is also used to interpret the event and phenomenon in a way that provokes the thinking of the learners (Jan and Rodrigues 2012). Krick-Morales (2006) asserts that many English language learners experience difficulties in word problems in mathematics. Learners are required to read and comprehend the text of the problem, identify the question that needs to be answered and solve a numerical equation. Jan and Rodrigues (2012) confirm this view by stating that learners are faced with difficulties in solving mathematical word problems most of the time because they do not comprehend the wording of the problem. They often misinterpret the problem as they rely on key words and come up with wrong answers because they experience a language barrier. Learners actually mismatch between text comprehension, situation comprehension and problem-solving procedures.

Understanding Operations Embedded in Word Problems

Learners have trouble in listening to all directions and executing all the steps in a problem and completing all the work, which requires mathematical skills to solve word problems. Aksu (2001) notes that learners' performance declines significantly in all four operations when the operations are presented in the form of word problems, with the greatest decline being in the multiplication operation. This is because learners lack the understanding of the different ways in which operations are embedded in word problems (Aksu 2001). Learners need to acquire the skill of identifying patterns and finding 'func-

tions' that link several entities (KZN-DoE 2011). According to Reikeras (2009), the calculation tasks are embedded in the text whose words and structure create problems (word problems).

Structure of the Word Problem

According to Reikeras (2009), the structure of word problems strongly influences the performance in mathematics regardless of age, and learners with persistent low achievement in mathematics display weak performance in solving word problems through all grades. Reikeras emphasizes that in solving word problems, learners need to sufficiently develop verbal skills in order to construct an appropriate, initial representation of the problem. Voyer (2010) points out the factor of comprehension, which could include representations, based on the learners' real world knowledge, in particular as a factor that influences learners' performance in solving word problems. Sepeng and Webb (2012) argue that highly articulate learners tend to dominate classroom discussions while low academic achievers usually remain passive and even when they participate, their contributions are comparatively weaker and their ideas are sometimes muddled. In the same vein, Sarmini (2009) alludes to learners' difficulties and poor performance in solving mathematics word problems as emanating from linguistic limitations rather than from intellectual or cognitive shortcomings.

METHODOLOGY

This section discusses the research plans and procedures used in the study reported in this paper. In addition, the procedures of inquiry and the specific methods of data collection, analysis and interpretation are presented. The section then concludes by providing an overview of issues of sampling, validity and reliability.

The study reported in this paper sought to answer the following research questions:

- What are the factors that affect learners' poor academic achievement in Grade 6 mathematics word problems?
- What are the errors made by the learners when they solve word problems?

Research Design

The study discussed in this paper followed a qualitative approach as a means for exploring

and understanding factors associated with participants' academic performance in mathematics word problem solving. Data was gathered in the participants' natural setting using focus group interviews. In the data analysis process there was a move from particular to general themes that emerged. The analytic framework that was used is discussed in one of the sections below. According to Creswell (2009), engaging in a form of qualitative inquiry creates space for research that honors an inductive style, with emphasis on individual meaning given to a social or human problem. In the study discussed in this paper, eight learners participated in a focus group discussion with the researcher. These learners were purposefully selected based on their varying performances as representative of the Grade 6 learners' overall performance in mathematics. As noted earlier, the purpose of the focus group interviews was to gain an understanding of how learners solve word problems and the perceived challenges encountered during this process.

Data Collection Instrument

The focus group interviews schedule was used to collect qualitative data. The data from the focus groups enabled the researcher to make sense of the factors that affected learners' academic achievements in Grade 6 classrooms when they solved word problems. An interview guide approach was used as the researcher set the sequence and wording of interviews in advance. Macmillan and Schumacher (2010) point out that a focus group is designed to obtain maximum perceptions on a defined area of interest in a carefully planned discussion where the environment is non-threatening and permissive. The focus group was used to create a space for learners to share their experiences of factors that affect their academic achievements and meanings that they make in solving word problems. A voice recorder was used to record the interviews.

In addition, another set of qualitative information was gathered from two mathematics teachers through a face-to-face semi-structured interview with each teacher that covered issues to answer the research question on the factors that affect the learners' poor academic achievement in solving mathematical word problems. It also brought an understanding of the pedagogies and instructional practices in their class-

rooms when they taught topics related to word problem solving. The interviews provided qualitative data. The instrument was aimed at addressing the following question: *What are the factors that affect learners' poor academic achievement in Grade 6 mathematics word problems?*

The objective was to explore and understand the factors associated with poor academic achievements in attempting to solve Grade 6 mathematical word problems.

Data Analysis

According to Creswell (2009), qualitative data analysis can be conducted concurrently with gathering data, making interpretations, and writing reports. In this study, qualitative data analysis followed Creswell's steps from the specific to the general, involving multiple levels of analysis. Creswell views this approach as being more interactive in practice, interrelated and not always visited in the order presented. Qualitative analysis is a relatively systematic process of coding, categorizing, and interpreting data to provide explanations of a single phenomenon of interest (MacMillan and Schumacher 2010). In this study the researcher used inductive analysis in order to synthesize and derive meaning from the data, starting with specific data on factors associated with learners' academic achievement and ending with categories and patterns. Furthermore, the qualitative data analysis involved gathering open-ended data, based on asking both learners and teachers general and specific questions. A qualitative analysis was developed from the information supplied by the participants.

Ethical Considerations

According to Babbie and Mouton (2008), researchers have a duty and obligation to abide by the code of conduct that governs most professions. Neuman (2003) argues that researchers have a moral and professional obligation to be ethical, even when research subjects are unaware of or unconcerned about ethics. When conducting research, social scientists enter into the private lives of their participants (Berg 2001). Researchers therefore have to make sure that the privacy, the rights, and the welfare of their participants are guaranteed (Kumar 1999).

For the purposes of a study reported in this paper, permission was requested from both the Department of Basic Education and the school in order to carry out the research at the participating primary school. The researcher obtained consent from the parents to work with their children in the study.

The researcher employed the following strategies, as suggested by Bogdan and Biklen (2007: 49-50) and Saritas and Akdemir (2009), to support the ethical approaches to fieldwork:

- ♦ The participants were informed that participation was voluntary and withdrawal without reprisal was accepted.
- ♦ The participants' privacy was honored.
- ♦ Unless otherwise agreed to, the informants' identities were protected so that the information collected did not embarrass or in any other way harm them.
- ♦ The informants were treated with respect and their cooperation in the research was sought.
- ♦ In negotiating permission to do the study, it was made clear to those with whom negotiations were undertaken what the terms of the agreement were, and the researcher abided by that contract.
- ♦ The researcher told the truth when writing up and reporting the findings.

RESULTS

For the purposes of the study discussed here, the learners' focus group data was analyzed through the use of semantic analysis. Semantic analysis was useful because it provided a descriptive presentation of qualitative data. Each participant in the interview was given a pseudonym. Participants were referred to as R1, R2 and R3, up to R8. A few extracts selected from the transcripts are used in this section as examples of learners' responses during the focus group discussion session with the researcher. The learners' responses are classified according to five secondary research questions and are presented below.

What are the problems that you experience when you solve word problems?

Extract 1

- R4: 'Reading and understanding the question'
- R2: 'Reading and understanding the sentence'
- R3: 'Adding the numbers'

R1: 'Reading and putting the number that is correct'

When asked about challenges that are encountered during word problem solving, the majority of the learners referred to reading as a major problem that seems to lead to poor interpretation of what the statement requires of them. It appeared that learners' poor reading skills were a key factor in their ability to make sense of the problem statement. Such observation is consistent with Sepeng's (2014) reports that demonstrated that learners' academic performance in mathematics word problems was strongly related to performance in reading comprehension. In studies conducted elsewhere, similar reports illustrated a close relationship between mathematics performance and reading skills. For example, scholars such as Zhang and Anual (2008) showed that difficulties in arithmetic were associated with the development of reading ability. Recent South African studies showed that learners struggled to understand what the word problem statement demanded from them in order to be good problem solvers (Sepeng 2013).

Learners' ability to solve mathematics word problems and the approaches that they use in the process were also probed. The rationale behind such a probe was to have an understanding of reasons underlying learners' ways of solving mathematics word problems the way they do. Extract 2 below shows that learners did not have a specific way and/or strategy of solving word problems, except that they followed and/or adopted the way in which it is usually modeled in class by the teacher.

Extract 2

R7: 'Because the teacher told us about examples'

R6: 'Just read the question'

R1: 'I wrote because I understood.'

R8: 'I wrote what the teacher told us from school.'

It appears that learners' problem-solving skills were limited to and reflected those of their teacher, acquired during the teaching and learning of mathematics in the classroom. Such a situation does not seem to have a positive influence on the academic achievement of these learners given a situation where learners do not have a space to select from a variety of strategies they should have learned in the classroom. Consequently, the learners are not in a position to develop and refine the own repertoire of prob-

lem solving strategies in order to boost their confidence in tackling problem-solving tasks in any situation.

The researchers also wanted to find out from the participating learners how their performance in word problems is affected by their problem-solving skills.

How do solving word problems affect your academic achievements?

Extract 3

R2: 'I was going to fail the test.'

R3: 'I was going to fail the exam.'

R8: 'I was going to repeat the class.'

R4: 'You will leave the school.'

R6: 'You will fail.'

Most of the learners commented that their academic achievements would be negatively affected if they could not solve word problems appropriately. These learners' experiences are associated with fear of failing tests or exams, repeating classes and even becoming dropouts, as mentioned by Josephine (1999). Learners' failure or lack of success leads to loss of motivation, which results in problems related to carelessness and inattention in solving word problems, thus affecting their academic achievements (Steele 2002).

What can the teachers do in order to help you in solving word problems better?

Extract 4

R6: 'I need the teacher to repeat the question.'

R3: 'To call the parents'

R8: 'You ask the teachers to give morning classes.'

The learners realized that teachers have to find a way of helping them to improve their ability to solve word problems. From the constructivist theoretical perspective, teachers have to interact with their learners about a problem-solving situation to enhance the learners' understanding. Sepeng's (2013) view of leadership, organization, management, decision-making within the school hierarchy and communication, taken as important factors in teaching learners how to solve word problems, is necessary and crucial. Teaching strategies and/or techniques such as code-switching, translation, and re-voicing might possibly draw on and promote the use

of home language of learners to enhance understanding in mathematics classrooms (Sepeng 2014). Amongst other things, learners need their parents to be part of their learning, as well as special programs to give them more time to learn, such as 'morning classes'. Furthermore, teachers ought to be explicit when teaching and they should repeat questions and instructions when necessary. Teachers should guard against sloppy and careless use of mathematical language, which might cause learners to misunderstand what is taught (Haylock and Thangata 2007).

What do you think you need to do as learners in order to understand solving word problems?

Extract 5

- R2: 'We need to revise at home'
- R6: 'To do your homework'
- R5: 'To do corrections'
- R4: 'To read at home'
- R1: 'To revise the task at home'
- R8: 'To do activities'

Almost seventy percent of the respondents indicated that they should do some kind of work at home, for example revising their work and given tasks, reading about mathematics word problems, and doing their homework. Sepeng (2013) argues that it appears as if teachers do not give the learners enough exercises to enhance components of problem solving such as decoding and interpreting, although teachers have a part to play in the process of teaching and learning. Learners have to be active in constructing their own knowledge and social interactions, as they are important to knowledge construction (Woolfolk 2007). The family structure, parents' educational level, parent and student attitudes toward school and parent involvement (Borman and Rachuba 2001; Campbell et al. 2000; Ilany and Margolin 2010; Oundo et al. 2014) are important since parents and siblings can help the learners do their homework, and in that way, improve the learners' academic achievements.

How do you feel about learning solving word problems?

- R3: 'I feel good because it is easy.'
- R7: 'I feel good because it gives me more practice.'
- R2: 'I do not understand it because I do not learn at home.'
- R8: 'I feel bad because there are too many instructions.'

R4: 'I feel happy because we are revising the tasks at home.'

R5: 'It feels good because we do tasks at home.'

A general response from learners in a discussion regarding their perceptions on solving mathematical word problems was that they enjoy, like and feel good about word problems. However, the results from this study on word problem task illustrated the negative influence of the stereotyped beliefs held by many people that mathematics is a difficult subject as alluded to by Mundia (2012), because more than ninety percent of the learners obtained less than level 3 (40%), which is a pass according to the Department of Education standard. Also the results differ from those of a study by Kenneth (1992) who reported that learners appeared to like solving word problems in mathematics the least.

Responding to the Primary Research Question

Learners struggle to comprehend text and identify questions that need to be answered (Krick-Morales 2006). Krick-Morales (2006: 3) further asserts, "If a student is learning English as a second language, he might not yet know key terminology needed to solve the equation." The teachers in the current study found that learners struggle with understanding when reading word problems and eventually the learners experience difficulties in solving these problems.

In this study other factors that were found to affect the academic achievements of Grade 6 learners when attempting to solve word problems were demographic factors related to the family structure, parents' educational levels (as they tended not to effectively support their children with homework), instructional teaching methods employed by the teachers, and learners' difficulty in transferring knowledge and connecting information to enhance the solving of word problems.

DISCUSSION

Learners struggle to comprehend text and identify questions that need to be answered (Krick-Morales 2006). Krick-Morales (2006: 3) further asserts that '[i]f a student is learning English as a second language, he might not yet know key terminology needed to solve the equation.' The teachers in the current study found that learners struggle with understanding when reading word problems and eventually the learners experience difficulties in solving these problems.

In this study other factors that were found to affect the academic achievements of Grade 6 learners when attempting to solve word problems were demographic factors related to the family structure, parents' educational levels (as they tended not to effectively support their children with homework), instructional teaching methods employed by the teachers, and learners' difficulty in transferring knowledge and connecting information to enhance the solving of word problems.

Thus the findings from this study concur with those of Campbell et al. (2000) and Borman and Rachuba (2001), who discovered that parents' educational levels, parent and student attitudes toward school and parent involvement can be factors that may affect the academic achievement of learners in solving word problems in mathematics. On a different note Saritas and Akdemir (2009) assert that instructional factors that cover teacher competency, instructional strategies and techniques, curriculum, school context and facilities negatively affect learners' performances.

CONCLUSION

The study reported in this paper sought to make a contribution towards understanding factors that are associated with Grade 6 learners' academic performance when they attempt to solve mathematics word problems. These factors were localized within participating learners' views and perceptions about their experiences in attempting to solve word problems. The key findings of the study outlined in this paper seem to suggest that the mathematics academic achievements of participating learners in Grade 6 classrooms in solving word problems are affected by a number of variables. The variables identified in this study are the importance of the correct mathematical language use, text comprehension and terminology, understanding operations embedded in the text, clarity of concepts and vocabulary and knowledge as well as the structure of the word problem. Furthermore, factors such as reading, understanding, sense making and problem solving emerged as primary predictors of academic achievement.

RECOMMENDATIONS

The Department of Education should train more mathematics teachers who will have the

background of the correct content coupled with a variety of strategies with more emphasis on challenging aspects and topics such as the solving of word problems in mathematics. It is crucial to have these relevantly trained teachers in the primary schools, as this is the foundation on which aspects have to be built on for present and future use.

Parents need to create a home environment that can affect children's learning by modeling responsibility as they help them do their homework and follow up to ensure homework is done all the time. This will build self-esteem and self-efficacy in the learners. Learners will in turn be motivated and the academic expectations will not stress the learners, as their performance will be better.

The school must enhance and demonstrate good leadership, organization, management, healthy decision-making within hierarchy and communication and follow-up on the correct implementation of the curriculum and competency of the deliverers of the curriculum.

The teachers and the school management team should promptly identify issues of mathematics anxiety and phobia that affect learners' social, emotional, and behavioral issues. These interfere with the achievement of success in mathematics, as learners develop feelings of dependence because they believe they cannot work without teachers.

Teachers in their teaching, should engage the learners in the interaction process of acquiring new knowledge through rethinking ideas, to argue, evaluate, share, examine and understanding the conceptual underpinnings of mathematics as they become better problem solvers. Teachers should be capacitated with a skill to develop and use a school-tailored framework in order to help the learners who experience difficulties in solving word problems. This will mean extra time for both the learners and the teachers.

REFERENCES

- Aksu M 2001. *Student Performance in Dealing with Fractions*. Turkey: Middle East Technical University.
- Babbie E, Mouton J 2008. *The Practice of Social Research*. Cape Town: Oxford University Press.
- Berg B 2001. *Qualitative Research Methods for the Social Sciences*. 4th Edition. Boston: Allyn & Bacon.
- Bogdan RC, Biklen SK 2007. *Qualitative Research for Education: An Introduction to Theories and Meth-*

- ods. United States of America: Pearson Education, Inc.
- Borman GD, Rachuba LT 2001. *Academic Success among Poor and Minority Students: An Analysis of Competing Models of School Effects*. U.S.: Johns Hopkins University.
- Campbell JR, Hombo CM, Mazzeo J 2000. *NAEP 1999 Trends in Academic Progress: Three Decades of Student Performance*. Washington, DC: National Center for Education Statistics.
- Creswell JW 2009. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks: Sage.
- Department of Basic Education 2011. *National Curriculum Statement (NCS): National Policy Pertaining to the Programme and Promotion Requirements of the National Curriculum Statement Grades R-12*. Pretoria: Department of Basic Education.
- Ellion S 2016. An investigation into the types of strategies used by grade 12 ordinary level mathematics learners of Kavango East Region in Namibia in solving algebraic word problems. *Imperial Journal of Interdisciplinary Research*, 2(12): 226-272.
- Haylock D, Thangata F 2007. *Language Difficulties in Mathematics: Key Concepts in Teaching Primary Mathematics*. London: SAGE Publication Ltd.
- Ilany B, Margolin B 2010. Language and mathematics: Bridging between natural language and mathematical language in solving problems in mathematics. *Creative Education*, 1(3): 138-148.
- Jan S, Rodrigues S 2012. Students' difficulties in comprehending mathematical word problems in English language learning contexts. *International Researchers*, 1(3): 151-160.
- Josephine A 1999. Factors Affecting Performance in Mathematics. From <http://www.ehow.com/info_8461363_factors-affecting-performance-mathematics.html> (Retrieved on 13 January 2014).
- Kenneth WM 1992. *The Relationship among Selected Factors Which Relate to Student Ability to Solve Mathematical Word Problems*. USA: Temple University.
- Krick-Morales B 2006. Reading and Understanding Written Math Problems. From <mhtml:file://E:\Reading and Understanding Written Math Problems ELL Topics from A-Z> (Retrieved on 23 June 2013).
- Kumar R 1999. *Research Methodology: A Step-by-Step Guide for Beginners*. Thousand Oaks, California: Sage.
- KwaZulu-Natal Department of Education 2011. *Mathematics Booklet 3 LO1 & 4*. KZN: DoE.
- Lave J 1992. Word problems: A microcosm of theories of learning. In: P Light, G Butterworth (Eds.): *Context and Cognition: Ways of Learning and Knowing*. New York: Harvester Wheatsheaf, pp. 74-92.
- MacMillan JH, Schumacher S 2010. *Research in Education: Evidence-based Inquiry*. 7th Edition. Boston: Pearson.
- Mundia L 2012. The assessment of math learning difficulties in a primary grade-4 child with high support needs: Mixed methods approach. *International Electronic Journal of Elementary Education*, 4(2): 347-366.
- Neuman W 2003. *Social Research Methods: Qualitative and Quantitative Approaches*. Boston: Pearson Education.
- Oundo EN, Poipoi MW, Were DS 2014. Relationship between parents' attitude towards educational involvement and academic performance of day secondary school students in Samia – Kenya. *International Journal of Human Resource Studies*, 4(3): 147-157.
- Reikeras EKL 2009. A comparison of performance in solving arithmetical word problems by children with different levels of achievement in mathematics and reading. *Investigations in Mathematics Learning*, 1(3): 49-72.
- Roberts N 2016. Additive relations word problems in the South African Curriculum and assessment policy standard at foundation phase. *African Journal of Research in Mathematics, Science and Technology Education*, 20(2): 106-118.
- Saritas T, Akdemir O 2009. Identifying Factors Affecting the Mathematics Achievement of Students for Better Instructional Design. From <http://www.itdl.org/Journal/Dec_09/article03.htm> (Retrieved on 13 January 2013).
- Sarmini SE 2009. *Exploring Bilingual Arab-American Students' Performance in Solving Mathematics Word Problems in Arabic and English*. PhD Dissertation, Unpublished. France: University of Orleans.
- Sepeng P 2013. Exploring mathematics classroom practices in South African multilingual settings. *Mediterranean Journal of Social Sciences*, 4(6): 627-638.
- Sepeng P 2014. Learners' voices on the issues of language use in learning mathematics. *Int J Edu Sci*, 6(2): 207-215.
- Sepeng P, Kunene N 2015. Strategies used by grade 6 learners when solving mathematics story problems. *Journal of Educational Studies*, 14(1): 101-124.
- Sepeng P, Webb P 2012. Exploring mathematical discussion in word problem-solving. *Pythagoras*, 33(1): 1-8.
- Steele MM 2002. Strategies for helping students who have learning disabilities in mathematics. *Mathematics Teaching in the Middle School*, 8(3): 104-143.
- Voyer D 2010. Performance in mathematical problem solving as a function of comprehension and arithmetic skills. *International Journal of Science and Mathematics Education*, 9: 1073-1092.
- Woolfolk A 2007. *Educational Psychology*. 10th Edition. Boston: Pearson Education, Inc.
- Zhang L, Anual S 2008. The role of vocabulary in reading comprehension: The case of secondary school students learning English in Singapore. *REL C Journal*, 39(1): 51-76.