MATHEMATICS TEACHERS' USAGE AND EXPERIENCES OF A NEW GRADE 7 TEXTBOOK

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ABSTRACT–The aim of this paper was to report on an investigation of how grade 7 teachers in Mashonaland East Province of Zimbabwe use the *Step in New Primary Mathematics Grade7* textbooks to interpret and simplify the mathematical language. A mixed methods research design was used. Stratified random sampling was used to select the respondents. Structured questionnaires (80), face-to-face interviews (6) and lesson observations (6) were used to collect data. Findings suggested that the difficulty of the textbook language was a contentious issue. Some teachers simplified the mathematics textbook language, engaged in language switching and used examples from the learners' backgrounds. The other teachers felt that the textbook language was accessible to the learners. There is need for teacher training programmes to incorporate aspects on interpreting and simplifying mathematics textbook language in their teaching methodologies. Teachers need to take into account the socio-cultural backgrounds of learners in their classrooms and use examples that the learners can identify with.

Keywords: Language mediation, mathematical language, new mathematics textbook, textbook usage.

1. INTRODUCTION

Research into mathematics achievement shows that mathematics planning and teaching is textbook driven in the majority of classrooms, which according to Moffett and Corcoran (2011) led to a call for research into textbooks and their use by teachers. In the view of Jamieson-Proctor and Byrne (2008) textbooks are a modern-day reality and mainstay in primary school mathematics classrooms, where they are used daily by the teachers and learners. McNaught (2005) estimated that 90% of mathematics lessons relied on mathematics textbooks, which makes textbooks synonymous with mathematics education. Even with the increased availability of technology as a medium of instruction, Howson (1995), as cited in Rezat (2006, p. 1260) observed that new technologies have not overtaken the outstanding role of textbooks and stated that: "Despite the obvious powers of new technology it must be accepted that its role in the vast majority of the world's classrooms pales into insignificance when compared with that of textbooks". Given this background, O'Keeffe & O'Donoghue (2014) highlighted the fact that the language used in mathematics textbooks worldwide has a pivotal role in the learning and understanding of mathematics. The Department of Basic Education (DBE), (2013) stated that there is need for teachers to focus on the correct use of the mathematical language and terminology, and to be wary of the possible interplay between everyday language and mathematical language.

The terminology used in the mathematics textbooks requires from the teachers to explain and clarify it for the benefit of the learners. This need is greater where English is a second language for most of the learners and especially those living in rural communities, with limited access to English literature. The motivation for studying teacher mediation of the mathematical language used in textbooks was that mastery of correct language improves the learners' conceptual understanding and procedural fluency (DBE, 2013). This mastery can be facilitated by the teachers' interpretation and simplification

of the textbook language. As Warren (2006, p.169) put it: "In relation to language, it is believed that one of the main reasons children experience difficulty in mathematics is in understanding the mathematical language".

A few studies (for example Haylock & Thangata, 2007; Moffet & Corcoran, 2011; Obara & Sloan, 2009; Rezat, 2006) that focused on the language difficulty of mathematics textbooks and on how primary school teachers mediate the language were identified. The term *mediation* was used by Rezat (2006) to describe the ways in which the teachers interpret, restructure, simplify and use the content in the textbook. The purpose of this paper is to describe how teachers interpret and simplify the language in the *Step in New Primary Mathematics Grade 7* textbook- a new school textbook-for the benefit of the learners. Although studies have been conducted on how teachers explain and simplify the language in mathematics textbooks, little research has been conducted in predominantly rural contexts of developing countries. This study attempts to fill that gap. Most of the rural environments are not well endowed with reading resources and most learners have difficulty in understanding what they read. This is further compounded by the relatively low literacy levels of the rural parents (Hoadley & Jansen, 2009).

The questions that guided the investigation were: Is the mathematics textbook language accessible to the grade 7 learners? In what ways do the grade 7 teachers in Mashonaland East Province of Zimbabwe mediate the mathematics textbook language?

2. THEORETICAL PERSPECTIVES

2.1. Socio-cultural theory

Textbooks are viewed as important in that they reflect the cultural values of a society (Brown, 2002 in Remillard, 2005; Haggarty and Peppin, 2004). This notion of textbooks reflecting a society's cultural values is related to the socio-cultural theory of learning. The theory was first developed by Vygotsky (1978) whose major argument is that human cognition and learning are more social and cultural than individual phenomena. Individuals formulate socio-cultural meanings from the activities and actions of others, using signs or symbols and tools. Mathematics can thus be viewed as being situated in a socio-cultural context, and uses signs, symbols and tools- a mathematical language - and textbooks that have a peculiar meaning. There is need to explain these peculiar meanings within the socio-cultural context of the learners. Vygotsky claims that social interaction is a key component in the development of knowledge. In a classroom setting this social interaction occurs between learners and teachers, with other learners, with textbooks and with other curriculum materials.

Vygotsky (1978) indicates that the ideas discussed in these social settings are external to each individual learner, and can be internalised or added to what the individual already knows. This 'transfer' from the external to the personal can only occur in each learner's zone of proximal development (ZPD). Van de Walle (2007, p.29) cites Goos (2004) who describes the *zone of proximal development* as "not a physical space, but a symbolic space created through the interaction of learners with more knowledgeable others and the culture that precedes them". The *zone of proximal development* has also been described by Vygotsky as "the distance between what one can achieve alone and what one can achieve with help" (Peer & McClendon, 2002, p.137). In other words, the learner exists at a particular level of development but can be 'pulled' to a higher level of achievement as a result of instruction, help from effective teaching, or from engagement with more capable peers. This help mostly comes from the mathematics teacher as he/she selects, explains and modifies the tasks in the textbook, and is called *scaffolding* (the connection-making process).

Therefore, learning can be promoted or impaired by the quality of social interactions that take place in the classroom set-up, and this includes the quality of tasks set in the textbooks, and how the teachers make use of them. Gorgorio` and Planas (2005, p.92) comment that: "From a socio-cultural perspective, mathematics learning is a process where cognitive, affective, social, cultural and linguistic aspects are deeply intertwined".
Socio-cultural theory was found relevant for this study because as Chikodzi and Nyota (2010, p.12) point out, "the unity between mathematics and culture is limitless". Also, as Turuk (2008) and Adler (1998) argue, language is an important socio-cultural tool or resource which helps the learners to understand mathematical concepts. The mathematics textbook is a socio-cultural artefact and we should study how it is used. Therefore an important task for the teacher is to foster the use and understanding of appropriate mathematical terms and expressions (Rezat, 2006). This can be accomplished by the teachers' interpreting and simplifying the textbook language using examples from the social and cultural backgrounds of the learners.

Since the mathematics textbooks are written in English, a second language to the majority of the Zimbabwean primary school learners, the mathematics teachers frequently engage in language switching. This involves the teacher substituting a home or local language term for a mathematical term in order to help the learners to understand a concept. *Language switching* has been shown to enhance the learners' understanding, especially when the teachers are able to use it to capture the specific nuances of the mathematical language (Setati & Adler, 2001, as cited in Antony & Walshaw, 2009).

2.2. Research studies on mathematics textbooks use

Various studies on mathematics textbook use have been reported in the literature, with a focus on language issues. Moffett & Corcoran (2011) in an evaluation of the implementation of new mathematics textbooks in Irish primary schools, used lesson observation and interviews of four teachers who had a reputation as good teachers. One area of their focus was the teacher support needs and constraints: textbook language was identified as a major constraint, and it was felt that the teacher's duty was to simplify the language so that learners could understand. One teacher said: '*The language would definitely have to be brought back to the children's world, to what they are used to'* (Teacher 4, p.4).

Haylock and Thangata (2007) found that technical vocabulary and syntax used in the mathematics textbooks presents language difficulties for the learners. Terms like 'odd', 'the difference between' and 'multiplication' require teachers to explain, simplify and use in such a way that learners grasp their specific meanings in mathematics. Bertoch (2014) says that how language is used in mathematics textbooks is important to study because textbooks are a primary instructional tool available to the teachers and learners. Students may experience difficulty in understanding the language of mathematics textbooks because mathematics is a language with peculiar vocabulary, symbols and pictorial forms. Bertoch did not go as far as explaining how teachers mediate the concept Variable when presented in the textbook.

Barrett's (2014) study addressed issues of language, learning and textbooks in Tanzanian secondary schools. One of the findings was that textbooks across all subjects at lower secondary school use difficult English language as well as long sentences. This makes mathematics learning difficult. Barrett notes that students learn concepts best in a language in which they are fluent. Similarly, Setati (2008) concluded from a study of South African mathematics classrooms that teachers need to recognise and use the learners' home languages as legitimate languages of mathematical communication. Both Barrett (2014) and Setati (2008) seem to be advocating the practice of language switching by teachers as a way of mediating the mathematics textbook.

3. METHODS

The study used pragmatism as the research paradigm.

3.1. Research methods

A mixed methods design consisting of structured questionnaires, face-to-face interviews and lesson observation was employed to describe how the grade 7 teachers mediated the mathematics textbook language. Mixed methods research has strengths which offset the weaknesses of both quantitative and qualitative research (Creswell, 2008). For instance, quantitative research "is weak in understanding the context or setting in which people talk, plus the voices of participants are not directly heard" (Creswell, 2008, p.9). However, qualitative methods often make use of a small number of participants in a study, thereby making it difficult to infer from the findings to a larger group. For instance, only six teachers participated in the interviews and the lesson observations, compared to eighty-two teachers who responded to the questionnaires.

3.2. Sampling

In order to obtain a representative sample, all the eight districts in Mashonaland East Province of Zimbabwe were placed in three categories: rural, peri-urban and urban. The schools were then selected from each of the three districts in the sample using stratified random sampling. Purposive sampling was used to select only the grade 7 teachers in these schools. Additionally two teachers per district were conveniently sampled and they were interviewed and also observed while teaching. The purpose was to get an equal representation of rural, peri-urban and urban grade 7 teacher participants. Altogether six urban, seven rural/farm and five peri-urban schools participated in the study.

3.3. Data collection methods

All ethical imperatives were taken into account at the various stages in data collection, such as ethical clearance, informed consent, confidentiality and anonymity of participants, respect of research sites and honest reporting. Visits were made to the schools where the questionnaires were distributed and interviews and lesson observations held. These visits helped the researchers to familiarize with the schools' procedures, to brief the heads of schools and teachers on the purpose of the study and to establish some rapport with the teachers who were going to be interviewed and observed while teaching.

The questionnaire was in 3 sections. Section A asked for the demographic information of the teachers. Section B had 20 six-point Likert type frequency scale questions. For example teachers were asked to indicate whether they felt the textbook language was easy for the learners and whether they simplified the textbook language when teaching. Section C had open-ended questions, for example: what makes it difficult to use this textbook when teaching mathematics? The questionnaires (90 of them) were personally delivered to the teachers at all the 18 sample schools. Each respondent was requested to enclose the completed questionnaire in the envelope supplied, seal it and drop it in the sealed box provided in the school office. The researchers visited the schools again after one week to collect the boxes of returned questionnaires.

Six teachers were interviewed from 6 different schools, two each from the rural, peri-urban and urban districts. Both pre- and post- lesson observation interviews were held with the teachers. The purpose of the pre-lesson observation interviews was to find out what the teachers said they used the textbooks for, and how they used them. One of the interview questions was: In what ways do

you mediate the mathematics textbook language? The post-lesson observation interviews helped to follow up on the teachers' decisions relating to the mathematics textbook language mediation as observed in the lessons. In order to capture the entire conversation, the interviews and lesson observations proceedings were tape-recorded, and this was complemented with note-taking for observed behaviours that could not be audio-recorded.

The same six teachers who were interviewed were also observed teaching mathematics lessons and using the *Step in New Primary Mathematics Grade 7* textbooks. The structured observation schedule involved taking notes on the teachers' frequency of explaining the textbook language. It included recording the section/page of the textbook and how it was explained. The questionnaire, interview and lesson observation data were collected concurrently over three weeks, in order to save on time.

3.4. Validity/reliability and trustworthiness of instruments

The validity of the questionnaires was enhanced through piloting to clarify the questions and instructions to respondents and by obtaining expert opinion of experienced mathematics teachers. The reliability of the questionnaire was determined by using the test-retest method. Shuttleworth (2009) pointed out that the test-retest method is one of the simplest ways of testing the stability and reliability of an instrument over time. The test-retest reliability was determined after the pilot test. The Likert scale used in this questionnaire is inherently an ordinal scale measure. The assumption that the researchers made in treating the questionnaire instrument as if it were an interval scale was that the 6 levels on the Likert scale could be assigned values as on a continuum from 1 (never) to 6 (always). The results of the test-retest scores yielded a correlation of 0,79. This indicates an acceptable level of reliability, because the value is closer to one than to zero (Pietersen & Maree, 2013).

The trustworthiness of the interviews and lesson observations was attained by taking into account the procedures for credibility, dependability and confirmability as suggested by Stringer (2008). The reporting largely used the exact words and expressions of participants (dependability), and the raw data was stored in a safe place in case an audit trail is necessary (confirmability).

3.5. Piloting

Before the main study was conducted, the researchers did a pilot study in order to test and improve the clarity of questions in the questionnaire, lesson observation and interview schedules. Eleven pilot study respondents were conveniently sampled from five schools all situated in the Mashonaland East Province of Zimbabwe. The participating schools and teachers fell within the same province or population that was the target of the main study, and were drawn from the three strata, namely the urban, peri-urban, and the rural/farming environments. These schools did not participate in the main study in order to avoid contamination. These teachers' responses and comments on the research instruments led to a reduction in the number of questions on language mediation in the questionnaire (from seven to five), and fewer lead interview questions.

3.6. Data analysis

In concurrent mixed methods the data collected from the different methods should be reported in an integrated manner (Creswell and Plano Clark, 2011). In this study integration was achieved by reporting the quantitative results from the questionnaires, qualified by explanations based on the interview and lesson observation data. Questionnaire data were tabulated in the form of frequencies and percentages of responses. Content analysis was used for the interview and lesson observation data.

4. FINDINGS AND DISCUSSION

In this section the results from the questionnaire, teacher interviews and lesson observations are presented, analysed and discussed. There were 82 usable questionnaire responses. Each of the rural, peri-urban and urban districts contributed an almost equal number of questionnaire respondents namely 28, 28 and 26 respectively. For the interviews and lesson observations two teachers each were drawn from the rural, peri-urban and urban districts. The results are presented as follows: the levels of difficulty of the mathematics textbook language, how often the teachers interpreted and simplified the language used in the textbook and the teacher actions in interpreting and simplifying the textbook language (e.g. teacher explanations, teacher questioning and teacher referring to accompanying pictures or to objects in the learners' social backgrounds).

4.1. The difficulty of the textbook language

The difficulty of the textbook language was a contentious issue, with some teachers indicating that it was easy to understand by grade 7 learners, yet many also revealed that they simplified the language used in the textbook. Closed-ended questions 8 and 9 on the questionnaire addressed this language issue, and the results are shown in Table 1.

Table 1: The extent of textbook language difficulty, and whether the teachers simplify the textbook language.

Question	Responses	Always	Very frequently	Occasionally	Rarely	Very Rarely	Never
Q8. The language used in the textbook was easy for grade 7 learners to understand.	Respondents	21	19	31	3	6	2
	Percentage of responses	25%	23%	38%	4%	7%	2%
Q9. I simplify the language used in the textbook.	Respondents	24	21	22	9	3	3
	Percentage of responses	29%	25%	27%	11%	4%	4%

The teachers' responses to closed-ended question 8 shown in Table 1 revealed that almost half of the teachers are of the opinion that the mathematics textbook language was always or almost always easy for the learners. It is however important to note that a total of 11 teachers were of the opinion that the textbook language was difficult for the learners. These teachers' opinion cannot be ignored, and it suggests that there is a need to interpret and simplify the mathematics textbook language. Thus the need for teachers to interpret and simplify the mathematics textbook language is evident.

On the same Table 1, and in response to closed-ended question 9, more than half of the teachers pointed out that they always or almost always simplified the language that was used in the textbook. This was good practice because in any textbook there are likely to be some terms that require simplification. On the other hand less than one quarter of the teachers responded that they rarely or

do not simplify the textbook language, presumably because they felt the learners found it easy to follow. Failure to understand the textbook language may result in the learners' incorrect interpretation of the demands of the questions.

The apparent contradiction in the teachers' responses to closed-ended questions 8 and 9 on the questionnaire may lie in the varied school environments. In question 8 most of the respondents felt the textbook language was easy for the grade 7 learners to understand. Also in response to question 9 more than half of the respondents simplified the language that was used in the textbook.

Question 5 on the questionnaire asked the teachers to indicate whether they felt that the learners were familiar with the examples and contexts used in the mathematics textbook. More than half of the teachers (54%) indicated that the textbook rarely or only occasionally used examples that the learners were familiar with. These responses suggested that some learners could truly be experiencing difficulty in understanding the textbook language and its examples. The following teacher interview responses are further proof of this problem.

Mrs. Gano: *Some of the content in the textbook is very difficult.*
Mrs. Demo: *The learners are not familiar with most of the contexts used in the questions because of their rural backgrounds, so I have to do a lot of explaining.*
Ms. Mbezo: *We would require training in textbook use to include mathematical language.*

The above teacher responses point to the need for training teachers on how to simplify mathematics textbook language. The rural teacher's (Mrs Demo) comment highlights the additional difficulty associated with context: that the textbook language and examples are biased towards the urban environments.

4.2. The teachers' actions in mediating the mathematics textbook language

When asked in the interviews how they dealt with such difficulties in the textbook the teachers' responses were as summarised here.

Firstly, the teachers have to spend time explaining the terms used in the question, since they are novel to most of the learners (and possibly to some of the teachers too). For example on page 123 of the textbook, question 3 begins: Standard eggs are sold at $1 each, but pullet eggs cost only 80 cents each. The teacher has to explain what a standard egg is, and how it differs from a pullet egg?

Secondly, the teachers had to explain the meaning of the number story first, leaving out the mathematical concept in it, in order for the learners to understand. This calls for the teacher to explain with examples from the socio-cultural context of the learners.
In the lesson observations, one lesson was on equivalent fractions. As a way of explaining this concept, the teacher, Ms.Mbezo, indicated to the learners that $^1/_2 = {}^2/_4 = {}^3/_6 = {}^5/_{10}$, and that these are called *equivalent fractions,* (she used the words: *Zvakafanana, kana kuti zvakainzana*) meaning that they are the same or equal in value. The fraction chart was used as a pictorial presentation to further elaborate and emphasise the concept of equivalence. In so doing this teacher was addressing both the conceptual and language difficulty of the term *equivalence* as being of '*equal value*'. This language switching helps the learners to grasp concepts (Antony & Walshaw, 2009; Barrett, 2014; Setati, 2008).

In another lesson, on percentages and discount, Ms. Pfumo (a teacher at one rural school) explained *discount* as the amount of money that is deducted from the sale price of an article when a customer

pays cash. She also engaged in language switching. This is how Ms Pfumo explained the term discount:

Mari yaunobvisirwa kana watenga chinhu. (The money deducted from the sale price when you buy an article). It is deducted when you pay cash, and this discount is expressed as a percentage, for example 10% discount when there is a sale; no mention of the amount of money, only the percentage.

Ms. Pfumo: *Yes, it is deducted when you pay cash, and this discount is expressed as a percentage, for example 10% discount when there is a sale; no mention of the amount of money, only the percentage. Turn to the picture given on page 157 of a shop which is offering discount: Zama Zama Outfitters. If you look at that picture what items does it say are sold in this shop?*

Learners: *Clothes.*

Ms. Pfumo: *10% off selected goods, meaning they will make you pay 10% less on the sale price. Question 5(a), men's long sleeved shirts @ $125,50 each. What is a long sleeved shirt? Do you see we have both long and short sleeved shirts in the picture? So first calculate 10% discount, then subtract this from the original price, this gives you the sale price.*

$^{10}/_{100}$ x $^{125,50}/_{1}$

=$12,55 discount.

So we must now go on to answer the question. Therefore the sale price is

$125,50-$12,55=$112,95.

This means you saved $12,55. So a discount results in you saving some money.

Ms. Pfumo also used a picture in the mathematics textbook to further develop the concept of discount. She spent time discussing the picture of Zama Zama Outfitters on page 157 in the textbook together with the learners and asking them a variety of questions, based on the picture, as listed here:

- Who are Zama Zama Outfitters?
- What goods are on sale?
- What is a short-sleeved shirt? A long-sleeved shirt?
- What percentage discount is being offered? On which products?
- What is *discount*?
- Why do shops give discount?
- In what ways do shop owners benefit from offering discounts?
- How do the customers benefit from receiving discounts?

As can be seen from this list of questions, both low and high order questions were asked. When used together with the picture of Zama Zama Outfitters, it had the effect of making the term 'discount' easier to explain and to understand. The combination of text and pictorial form was also advocated by Barrett (2014).

Examples of low order questions are: What goods are on sale? What is a short-sleeved shirt? What percentage discount is being offered? High order questions are: Why do shops offer discount? In what ways do shop owners benefit from offering discounts? How do the customers benefit from receiving discounts? When taken together these questions help to explain and clarify what discount

is and how it helps both the trader and the customer. This manner of questioning is good, and consistent with that advocated in Bloom's taxonomy of educational objectives (Lawton, 1982; Stenhouse, 1979). Even after doing a question on discount, Ms. Pfumo continued to interpret the answer in terms of how much the actual discount was, how much the customer would finally pay, and how much the customer would save. This approach helped the learners to understand the underlying reasons for offering discounts, as it went beyond the purely mechanical process of working out an answer.

In Mr Banga's lesson, which focused on conversions of time, one learner was asked to read out question 3(d) on page 92, but read it wrongly twice, first as 302 seconds, and then as 320 seconds, instead of 312 seconds! Instead of assisting this learner to read correctly, the teacher called on another learner to read the question. The focus of this post-lesson discussion was on the good practice of expecting from the learners to read out the question in the textbook aloud, and particularly in the form of assistance or intervention the teacher provides to those who cannot read, as was the case with the boy who failed to read '312 seconds' correctly. Mr. Banga pointed out that such problems are common in his class, and that he always tried to correct the learners' reading mistakes. Often, what they read wrongly was what they ended up writing in their mathematics exercise books. Obara and Sloan (2009, p.359) and Barrett (2014) agreed that it is good practice to simplify the language used in the mathematics textbook, and also to make the learners read out aloud passages or questions from the textbook. The latter practice helps the teachers to identify the learners' reading difficulties. Invariably, if learners cannot read it also means they do not understand how to do the class exercises and homework, leading to poor mastery of mathematical concepts.

Although the majority of the questionnaire respondents (54% altogether) said they used examples from the learners' background when explaining textbook concepts, there was confirmation of this practice in only three of the six lesson observations. There were also instances where the teachers' questionnaire and interview responses were at variance with what was observed in the lessons.

Three teachers– Ms. Pfumo, Mrs. Gano and Mr. Banga- made clear links between the topics in the mathematics textbook and real life objects, practices or natural phenomena. Socio-cultural theorists (Chikodzi & Nyota, 2010; Rezat, 2006; Turuk, 2008) support such practices Mrs. Gano brought 3-dimensional shapes to the classroom and also made important links between the work in the textbook on 3-D shapes and other learning areas, namely by referring the learners to the pyramids of Egypt. Mr. Banga's reference to the earth's rotation and how it results in day and night was an extension of the textbook work on the conversion of time, and also linked to Environmental and Natural Science. This practice helped the learners to understand the concepts better and they could link the mathematics they meet at school with what they already experienced in their natural and social environment. Thus it fulfilled the expectation to teach in context, by not confining mathematics to the four walls of the classroom. Ms. Pfumo referred the learners to the picture of Zama Zama Outfitters in the textbook (page 157) when discussing discounts on short, long-sleeved shirts and blouses.

Incidentally, Ms. Pfumo and Mrs. Gano were among the more qualified and experienced teachers in this study, since they both held a Bachelor's Degree in Education in addition to the certificate/diploma in education. This, to some extent, reflects a 'rich' teacher's subject content knowledge which, according to Hoadley & Jansen (2009, p.108), "enables a teacher to enrich the learning process with a broad range of illustrations, and to integrate prescribed content with the wider world, the learners' lives, and other learning areas." This is similar to what Stein and Kaufman (2010) meant in describing the quality of teacher textbook mediation and task implementation as dependent on the teachers' capacity (where capacity equates to the teacher's education, experience, knowledge of mathematics for teaching and mathematics professional development hours per year).

As reported earlier, the researchers observed that some teachers did not only simplify the language used in the mathematics textbook, but they also sometimes switched to the vernacular (Shona in this case) language in order to explain some concepts in a way that the learners could understand. This was confirmed in the questionnaire and interview responses, as well as in the lessons observed. These teachers explained and gave examples in Shona, then reverted to English and explained the same concepts in English as well. The simplification and explanation of mathematical terminology in part enabled the connection-making process that Vygotsky (1978) describes as *scaffolding*. It is this process of scaffolding that helps to develop the meanings of mathematical concepts. As Haylock and Thangata (2009) observed, mathematical language can be very intricate to some learners because it makes use of peculiar symbols and terms. Therefore language simplification and/or switching can be an important strategy to help the learners understand better, and develop in them an appropriate mathematical vocabulary.

5. CONCLUSION

The study investigated teachers' language mediation of *Step in New Primary Mathematics Grade 7* in Mashonaland East Province of Zimbabwe. The questions addressed were the difficulty of the textbook language and how the teachers mediated the language in their lessons. Literature shows a gap exists in research on teacher mathematics textbook language mediation in predominantly rural environments. The results of the study showed that there was no consensus among the grade 7 teachers on whether or not the mathematics textbook language is easy for the grade 7 learners. Only about half of the teachers explained and simplified the difficult textbook concepts, used examples that learners were familiar with, engaged in language switching and the use of pictorial illustrations. There is need to train teachers on how to interpret and simplify mathematics textbook language for the benefit of the learners. Further research should be conducted, preferably on a national scale and focusing on the mathematics textbook language difficulty, and how the teachers mediate them.

6. REFERENCES:

Adler, J. (1998). Lights and limits: recontextualising Lave and Wenger to theorise knowledge of teaching and of learning school mathematics. University of Witwatersrand.

Antony, G., & Walshaw, M. (2009). Characteristics of effective teaching of mathematics: a view from the West. *Journal of Mathematics Education, 2*(2): 147-164.

Barrett, A.M. (2014). Language, learning and textbooks: findings from baseline survey of form 1 students and teachers in Tanzania. LSTT research brief number 1: University of Bristol.

Bertoch, K. (2014). Language use in mathematics textbooks written in English and Spanish. Unpublished masters dissertation. Brigham Young University.

Chikodzi, I., & Nyota, S. (2010). The interplay of culture and mathematics: the rural Shona classroom. *The Journal of Pan African Studies,3*(10): 3-15.

Creswell, J.W. (2008). *Educational research: planning, conducting, and evaluating quantitative and qualitative research*. (3rd ed.). New Jersey: Pearson.

Creswell, J.W., & Plano Clark, V.L. (2011*). Designing and conducting mixed methods research.* Thousand Oaks: Sage Publications.

Department of Basic Education (2013). Curriculum and Assessment Policy Statement (CAPS). Participants' Orientation Manual, senior phase, grade 7-9 mathematics. Pretoria: Republic of South Africa.

Gorgorio`, N., & Planas, N. (2005). Social representations as mediators of mathematics learning in multi-ethnic classrooms. *European Journal of Psychology, 20(1),* 91-104.

Haggarty, L., & Pepin, B. (2004). An investigation of mathematics textbooks and their use in English, French and German classrooms: who gets an opportunity to learn what? *British Educational Research Journal,28*(4): 567-590.

Haylock, D., & Thangata, F. (2009). *Key concepts in teaching primary mathematics.* London: Sage Publications

Hoadley, U., & Jansen, H. (Eds.) (2009). *Curriculum: organising knowledge for the classroom* (2nd ed.). Cape Town: SAIDE.

Jamieson-Proctor, R., & Byrne, C. (2008). Primary teachers' beliefs about the use of mathematics textbooks. In: M. Goos, R. Brown, & K. Makar. (Eds.), *Proceedings of the 31st annual conference of the Mathematics Education Research Group of Australasia,* (pp. 295-302).

Lawton, D. (1982). *Social change, educational theory and curriculum planning*. London: Hodder & Stoughton.

Logan, M., & Tambara, C. (2010). *Step in new primary mathematics grade 7 pupils' book.* Harare: Longman.

McNaught, K. (2005). Texts as resources, not programs. *Australian Primary Mathematics Classroom, 10*(1): 9-11.

Moffett, P., & Corcoran, D. (2011). An evaluation of the implementation of Realistic Mathematics Education (RME) within primary schools in the North and South of Ireland. Final Report. Belfast: Stranmillis University College.

Obara, S., & Sloan, M. (2009). Classroom experiences with new curriculum materials during the implementation of performance standards in mathematics: A case study of teachers coping with change. *International Journal of Science and Mathematics Education, 8*(2), 349-372.

O'Keeffe, L., & O'Donoghue, J. (2014). A role for language analysis in mathematics textbook analysis. *International Journal of Science and Mathematics Education, 13(3):* 605-630.

Pietersen, J. & Maree, K. (2013). Standardisation of a questionnaire. In: K. Maree (Ed.), *First steps in research* (pp. 214-223). Pretoria: Van Schaik Publishers.

Remillard, J.T. (2005). Examining key concepts in research on teachers' use of mathematical curricula. *Review of Educational Research, 75*(2): 211-246.

Rezat, S. (2006). A model of textbook use. In: J. Novotna, H. Moraova, M. Katka & N. Stehlikova, (Eds.), *Proceedings of the 30th conference of the international group for the psychology of mathematics education, 4*(409-416). Prague: PME.

Setati, M. (2008). Access to mathematics versus access to the language of power: the struggle in multilingual mathematics classrooms. *South African Journal of Education, 28*: 103-116.

Shafiuddin, M. (2010). Co-operative learning approach in learning mathematics. *International Journal of Educational Administration,2*(4): 589-595.

Shuttleworth, M. (2009). Observational study- research without manipulation.Available at: http://explorable.com/research-methodology.html[Accessed: 12 February 2011].

Stein, M.K., & Kaufman, J.H. (2010). Selecting and supporting the use of mathematics curricula at scale. *American Educational Research Journal, 47*(3),663-693.

Stenhouse, L. (1979). *An introduction to curriculum research and development*. London: Heinemann.

Stringer, E. (2008). *Action research in education* (2nd ed.). New Jersey: Pearson.

Turuk, M.C. (2008). The relevance and implications of Vygotsky's socio-cultural theory in the second language classroom. *Annual Review of Education, Communication and Language Sciences, 5*, 244-262.

Van de Walle, J.A. (2007). *Elementary and middle school mathematics: teaching developmentally* (6th ed.). Boston: Pearson.

Vygotsky, L.S. (1978). *Mind and society: the development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Warren, E. (2006). Comparative mathematical language in the elementary school: a longitudinal study. *Educational Studies in Mathematics, 62,* 169-189.