



Instructional Strategies for Effectively Teaching Mathematics in Grade 1 Classrooms in Rumanyo: A Kavango East Region Case

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Abstract

Fluency in the dominant language of learning, teaching, and evaluation is a critical issue for inclusivity and equity. The present study sought to establish instructional strategies that may be devised by the Rumanyo teachers to effectively teach mathematics for Grade 1 learners in the medium of Rumanyo as a mother tongue in the Namibian context. This study used a mixed-methods research approach and a constructivist theoretical framework. A mixed-method research design was chosen because it is necessary to demonstrate the validity and reliability of the quantitative components when using mixed methods, as well as the integration of qualitative and quantitative findings across the entire study. The sample size was chosen on purpose. In the Kavango East Region (KER), the sample comprises of ten teachers, five management personnel, and three advising teachers. Based on the following standards, purposeful sampling was used: Only Grade 1 teachers with at least one year of teaching experience, graduate from any colleges, the University of Namibia, and other institutions, teachers enrolled in the University of Namibia's Diploma in Junior Primary Education (DJPE) programme who are teaching in Rumanyo, principals or head of department (HOD) at a school, and teachers undergoing In-Service Educational Training (INSET) and advisory board members. These instructors and advisory educators were chosen because it was believed that they would have information regarding how the mother tongue affects maths performance. A classroom observation checklist and the focus group interview guide were used to collect data. While quantitative data were provided in tables and graphs and employed descriptive analysis to analyse the data, qualitative data were presented verbatim and in themes and were subjected to content analysis. The findings reveal that

teaching aids like stones, bottle tops, and any kind of seeds like mahangu seeds, beans, and ground nuts help my students in counting and solving addition and subtraction sums. The study recommends that further study is sought to establish hindering factors of teaching mathematics in the medium of Rumanyo and develop a framework to enhance mathematics instruction in the medium of Rumanyo. Also, an App titled “Shinyanga” should be developed in the language of Rumanyo by adapting it from the existing App of the Oshindonga dialect with the goal of linking Rumanyo-speaking youngsters to their language by allowing them to listen to historic Rumanyo folklore, songs, and poems. As a result, they would be able to supplement their language skills.

Subject Areas

Education, Linguistics

Keywords

Instructional Strategies, Kavango East Region, Mathematics Teaching, Medium of Instruction, Rumanyo, Shinyanga App

1. Introduction

[1] hypothesises that more competency in the Medium of Instruction (MoI) is a prerequisite for effective Instructional Communication (IC), with the latter being required for higher cognitive processes, positive effects, and improved performance in the learning environment. Robertson and Graven [2] establish that across numerous contexts, research has shown that native speakers of the language of teaching and assessment outperform non-native speakers on mathematical tests. Fluency in the dominant language of learning, teaching, and evaluation is a critical issue for inclusivity and equity in this regard. However, we must emphasise that this does not imply a deficit conceptualisation of pupils learning in a second language. Indeed, bi- or multilingualism can provide numerous learning benefits when L2 students’ native languages are considered as resources rather than issues [3].

The study of [4] about “Using Code-Switching as an Empowerment Strategy in Teaching Mathematics to Learners with Limited Proficiency in English in South African Schools” reveals that code-switching is a widespread approach used by teachers around the world to transfer knowledge to learners in bilingual and multilingual environments. Numerous code-switching functions have been devised and proposed by researchers to highlight how they may be used to empower learners and characterise bilingual and multilingual speakers’ abilities to express themselves in two languages. They have also proposed using it as an educational resource to assist learners in acquiring competency in a second language and demonstrating its sociolinguistic influence among those who use it. To date, re-

search into code-switching has grown at an exponential rate, prompting the development of novel functions for its application. Code-switching is a communication tactic for bridging “the gap of linguistic competence between the two languages”. The present study sought to establish instructional strategies that may be devised by the Rumanyo teachers to effectively teach mathematics for Grade 1 learners in the medium of Rumanyo as a mother tongue in the Namibian context. Correspondingly, the study of [5] about “When Language Gets into the Equation: Mother Tongue-Based Multilingual Education (MTB-MLE) Policy Appropriation in Elementary Mathematics Instruction” reveals that it was common throughout the fieldwork to encounter teachers and students conversing in a combination of Hiligaynon and English both within and outside the classroom. Code-switching was common in a mathematics class, in particular, where instructors and students were expected to use Hiligaynon as their primary language of teaching. This was accurate for every Class 1 looked at. Contrary to what the law requires, maths was not only taught in Hiligaynon by teachers. Instead, they clarified the debate with Hiligaynon while teaching the fundamental ideas and mathematical terminology in English. Teachers said that this practice is the greatest approach to adhere to the policy while still enabling the pupils to gain from the learning process when questioned about it. Teachers also mentioned that letting pupils switch between codes during a discussion helped them feel more at ease and expressive when presenting their opinions. Except for those times when students clarified difficult mathematics words in Hiligaynon and teachers responded and explained in English, courses functioned smoothly with both teachers and students swapping codes.

The study of [6] about “An Effective Tool for Oshindonga Early Development Education: Lilonga-Nenyanyu Learning Application” affirms that Namibia has a great variety of indigenous languages spoken [7] and they have developed an Android App in the Oshowambo dialect, because over half of the population speaks Oshiwambo languages, the application’s content is in Oshindonga, an indigenous language of the Oshiwambo dialect. The Lilonga-Nenyanyu Application (LNApp) is an Android App developed to help youngsters supplement their knowledge in two of the most important topics in school: Mathematics and Oshindonga. The Oshindonga equivalent of Happy Learning in English is Lilonga-Nenyanyu. The LNApp includes enjoyable games relating to the two disciplines. The LNApp’s learning activities include the fundamentals of mathematics (counting, addition, subtraction, division, and multiplication), as well as the fundamentals of the language (reading, pronouncing different Oshindonga phrases, vowels, songs, and learning the alphabet). Another study done in Namibia by [8] aimed at gathering Oshiwambo language children’s songs, poetry, and stories and creating an Android App to host them developed an App. The use of technology in language teaching and learning has proven to be successful [8], and mobile learning has grown in popularity. Because of the prevalence of mobile devices, the younger generation can participate in learning activities on

mobile devices in both official and casual contexts. Interactive mobile applications have also grown in popularity among youngsters and young people over the years. Some applications were created for educational purposes, while others were created for entertainment purposes.

In this study, an Oshiwambo application called Ndungika App was created with the goal of linking Oshiwambo-speaking youngsters to their language by allowing them to listen to historic Oshiwambo folklore, songs, and poems. As a result, they would be able to supplement their language skills.

The study of [9] about “Challenges of Teaching Mathematical Problem-Solving Skills: A Case of Junior Primary Schools in Kunene Region Rural-Farm Schools, Namibia” reveals that the majority of teachers struggled to use effective teaching strategies while teaching young learners mathematical problem-solving skills. The most popular teaching tactics used by teachers for teaching mathematical problem-solving skills were identifying important phrases in story problems and the use of manipulatives. Manipulatives assist students to visualise what they are reading in the word problem. They can look at the problem concretely and physically manipulate the materials to develop a solution. Other problem-solving skills, according to [9], include drawing diagrams, producing charts, working backward, guessing, and checking. Moreover, the method of creating pictures will aid learners who are visual learners. For the student, this makes the situation more concrete and real. [10] agrees with Kleopas [9] and believes that the use of visual aids such as manipulatives and concrete objects in mathematics teaching and learning is essential. Furthermore, the ineffective use of visuals has dominated mathematics teaching and learning in Africa. It is suggested that a lack of visual aids in mathematics teaching contributes to low exam performance. Correspondingly, [11] supports that using visual representations of words aids student comprehension. Think-aloud can also be used by teachers to incorporate discourse with mathematical language in context. Vocabulary growth can also be aided by modelling, acting out new words, and displaying images of English and Spanish (and other home languages) words around the room. Teachers can provide opportunities for multilingual pupils to learn math academic vocabulary as well as general and academic vocabulary applicable to other curriculum areas. Examining whether math content contains linguistic traits unique to the subject, such as passive voice or how to “justify your response” to a mathematical problem [12].

Anchor charts, which are used to anchor student thinking, help to make student thinking more visible because the teacher documents the modelled stages or techniques on large chart paper to anchor student thinking (see **Figure 2** for an example). Anchor charts differ from classroom charts in that they are built in collaboration with students in order to engage them as active participants in learning [13]. Rather than a commercial chart or one created by the teacher before the session, the content of the chart is determined by what students say. Thus, anchor charts benefit both language learners and students of varying ability levels because they enable access to content, break down the phases of a math

process, and allow youngsters to be coauthors of the class's community knowledge [14].

According to [15], in order to teach mathematics, teachers must have a thorough mastery of both math content and methodology. According to researchers, "It is not only knowledge of content, on the one hand, and knowledge of pedagogy, on the other hand, but also a kind of amalgamation of knowledge of content and pedagogy that is central to the knowledge needed for teaching" in mathematics classes. A math-literacy integration strategy can be used to combine these two forms of knowledge. Language arts and linguistic literacy are linked to mathematical literacy in this method. [16] still contends that a math-literacy integration method can be implemented in the classroom in part by using story-books that relate mathematics to language arts. Rather than limiting students' learning to a single story in a book, the lesson taught in this study required students to create their own stories for their dice sticks and gardens, while also using the Indigenous Story of How the Flowers Came to Be as a literary foundation for the mathematics lesson. The personalised dice sticks, gardens, and stories generated by the students throughout the course can all be seen as identity texts created by the students with the teacher's supervision and assistance. Through the construction of identity texts, students are able to build a personal connection with the concept of addition in this lesson, as they used their own understandings and experiences within the structure of the lesson to develop a richer, more meaningful connection to mathematics. In support of this, the study by [17] suggests that teacher training institutions should offer FP instructors sufficient and pertinent professional training, so they can teach in isiXhosa as effectively as possible. The authors advise making isiXhosa versions of all textbooks, readers, instructional materials, study aids, and associated literature available.

The study by Englis and Boholano [17] conducted in the Philippines about "Mother Tongue-Based Instruction in Teaching Elementary Mathematics" reveals that the use of language as a teaching tool is essential in developing students' proficiencies and competences, and it is still a topic that worries many academics, educators, and linguists. If the language used to teach promotes a meaningful and real flow of ideas between the teacher and the student, then learners will experience meaningful learning. The language used matters, especially when dealing with situations that indicate how familiar learners are with the style of language used in instruction. The language employed is especially crucial when dealing with situations that reveal how familiar learners are with the chosen medium of instruction. This study further recommended that teachers should be trained to use the Mother Tongue-Based Mathematics instruction and adopt the Mother Tongue-Based Mathematics instruction strategy. Substantively, [18] asserts that in vocational and educational settings, where it is crucial, basic arithmetic operations (addition, subtraction, multiplication, and division) are frequently utilised. To think critically and creatively, however, math skills alone are insufficient for learners. For spatially talented students to succeed in a variety of fields, there is a need for the mastery of mathematical language and

verbal skills. Mother Tongue-Based Education is a novel method of instruction in the K-12 Curriculum. According to the Department of Education, the goal of a multilingual education programme is to help students acquire the necessary cognitive and reasoning abilities, so they can communicate effectively in a variety of languages, beginning with their mother tongue.

Above this assumption, the researchers set out to conduct a study that would be useful to language instructors who teach at the junior elementary level and who do so in their own tongue. The present study sought to establish instructional strategies that may be devised by the Rumanyo teachers to effectively teach mathematics for Grade 1 learners in the medium of Rumanyo as a mother tongue in the Namibian context. Specifically, this study sought to fulfill the following research objectives:

- 1) To establish instructional strategies that may be devised by the Rumanyo teachers to effectively teach mathematics for Grade 1 learners in the medium of Rumanyo as a mother tongue in the Namibian context.

- 2) To recommend effective instructional strategies in teaching Grade 1 mathematics in the medium of Rumanyo.

2. Methods

This study used a mixed-methods research approach and a constructivist theoretical framework. A mixed-method research design was chosen because it is necessary to demonstrate the validity and reliability of the quantitative components when using mixed methods, as well as the integration of qualitative and quantitative findings across the entire project [19] [20].

Eight selected schools per circuit that offered Rumanyo Language (RL) as a Medium of Instruction (MoI) in Grade 1 in the Kavango East region served as the study's units: Rundu Circuit and Ndiyona Circuit. The sample size was chosen on purpose. In the Kavango East Region (KER), the sample comprises of ten teachers, five management personnel, and three advising teachers. Based on the following standards, purposeful sampling was used: Only Grade 1 teachers with at least one year of teaching experience, graduates from any colleges, the University of Namibia, and other institutions, teachers enrolled in the University of Namibia's Diploma in Junior Primary Education (DJPE) programme who are teaching in Rumanyo, principals or Head of Department (HOD) at a school, and teachers undergoing In-Service Educational Training (INSET) and advisory board members. These instructors and advisory educators were chosen because it was believed that they would have information regarding how the mother tongue affects maths performance. A classroom observation checklist and the focus group interview guide were used to collect data. While quantitative data were provided in tables and graphs and employed descriptive analysis to analyse the data, qualitative data were presented verbatim and in themes and were subjected to content analysis.

An expert assessed the study's data collection questions to assess their validity by making sure they were relevant to the study's goals, that they weren't ambi-

guous, and that the participants could understand them. Participants received the interview guide and consent form before the actual interview once the framework and interview questions had been carefully developed and detailed.

3. Results and Discussion

3.1. Demographics Characteristic and Statistical Results

This study selected ten teachers, five management personnel, and three advising teachers as the samples. **Table 1** shows the demographics characteristic and statistical results.

3.2. Gender and Age

Figure 1 is a comparison chart of the statistical results of the gender distribution among three groups of participants. **Figure 2** shows the age distribution of them.

As shown in **Figure 1**, only two of the ten teachers are male, resulting in a male-to-female ratio of 1:4. In the groups of management members and advising teachers, the percentages of females are 60% and 67% respectively. This suggests that first grade has a higher proportion of female teachers. In terms of age distribution (**Figure 2**), eight of the ten teachers are below the age of 36, four of the five management members are above the age of 36, while all three advising teachers

Table 1. Demographics characteristic and statistical results of the participants.

Categories		Teacher (T)	Management Member (MM)	Advising Teacher (AT)
		10	5	3
Gender	Female	8	3	2
	Male	2	2	1
Age	25 - 29	6	0	0
	30 - 35	2	1	0
	36 - 45	1	3	2
	46 - 50	0	1	1
	51 - 55	1	0	0
	<5	1	0	0
Teaching Experience (Years)	5 - 15	6	0	0
	16 - 25	2	3	2
	26 - 35	1	2	1
	INSET Student	3	0	0
Qualification	BETD	5	3	0
	BETD + ACE	1	0	0
	BED HONNORS	1	2	3

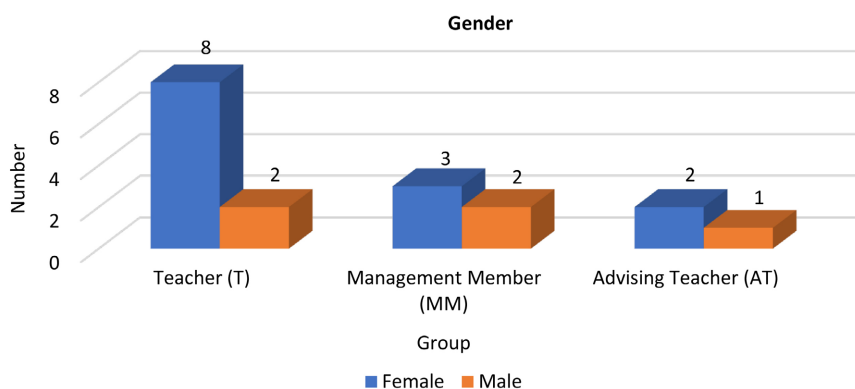


Figure 1. Distribution of gender.

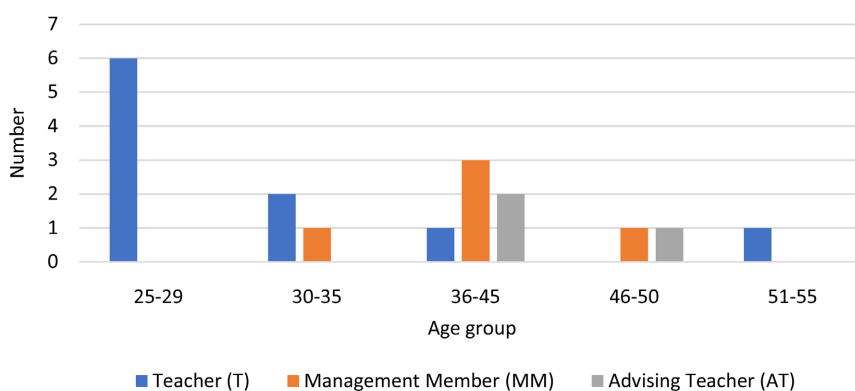


Figure 2. Distribution of age.

are above the age of 36. This suggests that the management team members were knowledgeable, competent, and of a mature age. As for the advising teachers, it is an excellent age group because they demonstrate that they are responsible enough to give advice to the Rumanyo teachers about how to instruct maths in Grade 1 using the Rumanyo language.

3.3. Teaching Experience and Qualifications

Figure 3 displays the distribution of participants' teaching experience. Seven of the ten teachers have less than 16 years of teaching experience (70%), all five management members have more than 16 years of teaching experience, and all three advising teachers have more than 20 years of teaching experience.

In terms of qualification, the majority of principals and HODs, however, merely possessed a diploma, as evidenced by the fact that three management personnel had a BETD and two held a BED honours degree. One of the presumptions that these educational variations also contribute to the challenges faced when teaching mathematics using MT is that the management will be better able to handle any modifications to the curriculum the further along, they are in their schooling.

The teaching background and credentials of the advising teachers are displayed in **Table 2**. From the chart, it can be inferred that the advisory teachers

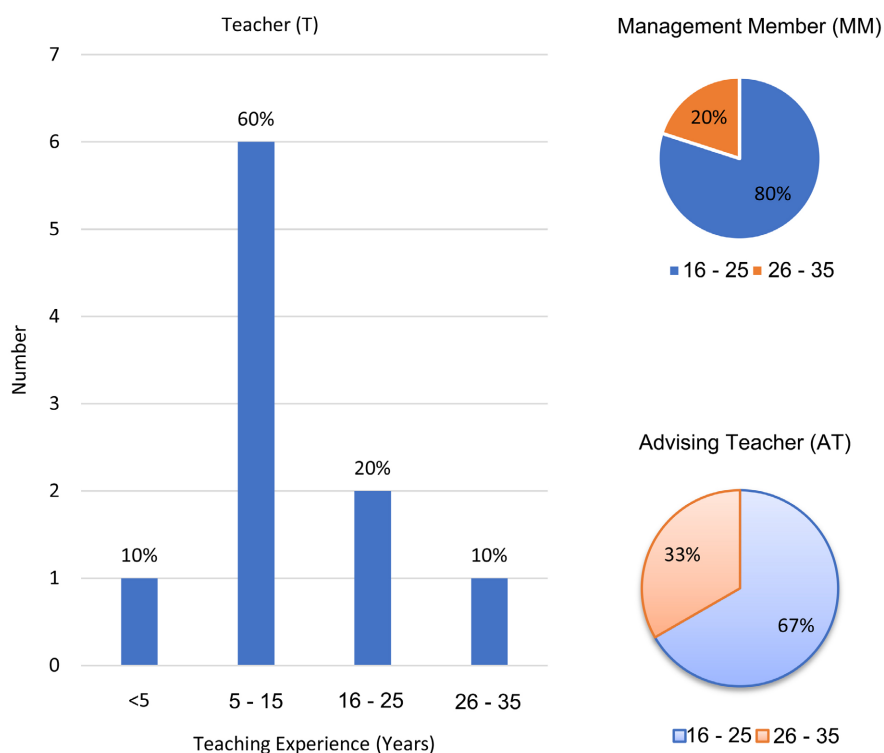


Figure 3. Distribution of teaching experience.

Table 2. Teaching experience and qualifications of advising teachers.

Advising Teacher (AT)	Teaching Experience (Years)	Qualification
AT1	24	BED HONNORS
AT2	27	BED HONNORS
AT3	25	BED HONNORS

have enough expertise to give the Rumanyo teachers guidance on how to teach Grade 1 mathematics in the mother tongue.

3.4. Strategies to Improve the Effectiveness of Using MT in Teaching Mathematics

In Review 1, the participants were asked to offer suggestions for ways to restore the effectiveness of employing RL in science instruction. The respondent highlighted the following actions that teachers and managers must take in order for mother tongue to be an effective maths teaching method: Teachers suggested that school administration hold an orientation session for new hires at their institutions, use teaching materials derived from their cultural context, and set up remedial instruction to help students catch up on past coursework that looks challenging to them. According to one focus group participant, “*I usually give my students extra classes after school at 15h00 to assist students with learning difficulties. Teaching aids like stones, bottle tops, any kind of seeds like mahangu seeds, beans, and ground nuts help my students in counting and solving addition*

and subtraction sums (T6)". This remark indicates that the respondent uses extra courses as one of her tactics for assisting students who struggle with maths, emphasising the use of teaching resources drawn from the students' cultural context to improve students' grasp of counting and sum computation. These findings are affirmed by the studies of [9] and [10] that believe that the use of visual aids such as manipulatives and concrete objects in mathematics teaching and learning is essential. Furthermore, the ineffective use of visuals has dominated mathematics teaching and learning in Africa. It is suggested that a lack of visual aids in mathematics teaching contributes to low exam performance.

Other tactics identified by the participants included asking community experts (such as retired teachers or pensioners) for help in interpreting mathematical concepts and selecting effective teaching techniques; setting up peer teaching within the school or between schools in the neighbourhood, where one teacher would observe another and the two would prepare certain themes together; and meeting at the cluster level at the start of the year to create a term plan and scheme of work. This will help them understand some challenging mathematical concepts.

4. Conclusions

Based on the above findings, one may conclude that that teachers do not have a lot of strategies to device in teaching mathematics through the medium of Rumanyo in Grade 1 classrooms. Thus, the reviewed related literature supplements to the teaching strategies that Rumanyo teachers may adopt to teach mathematics in Rumanyo such as using technological Apps by benchmarking from the already-existing Apps in the Oshindonga dialect, the use of codeswitching and anchor charts.

In the final analysis, the present study focused on the establishment of instructional strategies to teach mathematics in the medium of Rumanyo in Grade 1 classrooms. Further study is sought to establish hindering factors of teaching mathematics in the medium of Rumanyo and develop a framework to enhance mathematics instruction in the medium of Rumanyo. Also, an App titled "Shinyanga" should be developed in the language of Rumanyo by adapting it from the existing App of the Oshindonga dialect with the goal of linking Rumanyo-speaking youngsters to their language by allowing them to listen to historic Rumanyo folklore, songs, and poems. As a result, they would be able to supplement their language skills.

Conflicts of Interest

The authors declare no conflicts of interest.

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