

English as a Language of Preference in Mathematics Learning: Perspectives from High School Learners in Township Contexts

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Abstract: The exploration of language preference among mathematics learners in multilingual contexts remains a significant area of study. The aim of this study is to identify the most effective linguistic tools that contribute to the academic achievement of secondary school learners in mathematics. This study specifically examines English as a preferred language for mathematics instruction among high school learners in a Soshanguve community in the Tshwane West District of South Africa. It investigates the attitudes of mathematics learners towards the use of English as the medium of instruction and the reasons for their preference for learning mathematics in English. The study uses a non-experimental quantitative descriptive survey with a sample of 101 high school mathematics learners. Data was collected using a self-administered survey questionnaire conducted on paper. The primary data was analysed using descriptive statistics. The results indicate that English is the preferred language for learning mathematics. The study also demonstrates that the inclination towards the English language among high school learners is driven by factors such as pedagogical, social, linguistic competence, and economic considerations. The research findings suggest that the use of

English as the medium of instruction is crucial for the acquisition and achievement of mathematics skills. This is because learners' indigenous African languages are inadequate as a medium of instruction in mathematics classroom conversations among high school learners. Therefore, it is recommended that the Department of Basic Education and mathematics educators should enhance learners' English language competence by implementing intense and enriched language programmes.

Keywords: High school learners, language preference, mathematics learning, multilingualism, township contexts.

1. Introduction

The prevalence of English Medium of Instruction (EMI) is increasing in multilingual mathematics classroom discourse where English is not the predominant spoken language (Macaro et al., 2018). However, EMI is highly controversial in mathematics education in countries where most learners are not native English speakers (L1 speakers). Prediger et al. (2019, p. 11) remind us that 'language is a major learning medium used for communication and the acquisition of knowledge in mathematics classrooms', making it imperative for language to become a learning goal in mathematics classrooms. Existing research on the role of language in mathematics education in primary and secondary schools strongly supports the preference for instruction in indigenous African languages rather than English as the medium of instruction. Sibanda and Graven (2018, p. 11) note that 'access to mathematics learning and successful interpretation of assessments depends to a large degree on understanding the language of instruction, teaching, and assessment.' On the other hand, some studies have shown that instruction and knowledge acquisition in one's indigenous African language positively affects cognitive growth and mathematics achievement (Seid, 2016; Seid, 2019; Taylor & von Fintel, 2016; Ramachandran, 2017). In Africa, particularly in countries where English is the official language, there is a clear trend in education language policy toward transitioning from instruction in the indigenous African language to instruction in English as the primary language (Clegg & Simpson, 2016). The

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adoption of EMI in early elementary mathematics classroom discourse is often influenced by the belief that academic progress is strongly linked to the amount of time learners are exposed to English-medium instruction (Piper et al., 2016). Within the South African mathematics teaching and learning context, Grade 12 mathematics assessments exclusively employ only two out of the country's 11 official languages, namely English and Afrikaans (Mohlhlo & Ditsele, 2022; Saliwa-Mogale, 2021). This language choice was driven by the desire of the Afrikaners, who held political power at the time, to ensure that their children were not challenged by learning mathematics through a second language (English). Sadly, despite various language-in-mathematics research initiatives, there has been no comparable progress in achieving the same high standards of academic, linguistic, and technical accuracy for the indigenous South African languages. Although it would be ideal, it is unlikely that mathematics materials will be developed in all indigenous African languages in the near future due to the perceived dominance of English as the language of power (Robertson & Graven, 2019a).

Soili (2021) observed that there is typically a significant increase in the number of learners enrolled in English-medium mathematics classrooms in post-colonial cultures. Parents of black African children are committed to English language medium mathematics discourses because they believe English is the language that enables their children to achieve upward social mobility. They also believe that competence is best achieved in English-medium mathematics environments that provide ample time for focused learning (Probyn, 2021). Minority groups lacking economic opportunities have been influenced to view English-language mathematics classroom discourses as the only means to achieve upward social mobility (Tollefson & Tsui, 2018; Shinga & Pillay, 2021).

The acquisition of mathematical knowledge and language usage are closely connected. According to Sapire and Essien (2021), education is vital for achieving the objectives of the 21st century. Mathematics and language are widely recognised as the two essential pedagogical tools for the academic success of secondary school learners. However, there is an ongoing dispute about which language(s) should be used for teaching and acquiring mathematical knowledge (Mohohlwane, 2020). Language is identified as the primary obstacle to understanding mathematics content in South Africa (Mabena et al., 2021). Mathematics communication is conducted in a language that is not adequately understood by both the learner and the teacher. As a result, opportunities for active participation and comprehension of the subject matter are missed. This leads to unequal access to knowledge, which contributes to poor academic achievement among learners. Several studies conducted in South Africa have explored the relationship between language and mathematics, demonstrating that South African learners who struggle with mathematics show improved academic performance when given the opportunity to participate in their indigenous African languages (Sibanda & Graven, 2018; Planas, 2018; Prediger et al., 2019; Robertson & Graven, 2019).

1.1 The linguistic nature of township schools

Township schools are characterised by linguistic heterogeneity (Deumert, 2013; Krause-Alzaidi, 2021; Mesthrie & Hurst, 2013). The linguistic composition of townships is, therefore, described as heteroglossic, which is an environment where rules and norms overlap traditional language boundaries (Makalela, 2013). Heteroglossia, as conceptualised by Bakhtin (1981), encompasses the presence of multilinguality, multivoicedness, and multidiscursivity prevalent in a society, specifically in the township mathematics classroom. This linguistic composition provides an ideal context for a "language shift" towards English (Anthonissen, 2009). Due to the heterogeneous linguistic nature of township schools, English as the medium of instruction is perceived as a language that represents ethnic neutrality, upward social mobility, and success beyond the township (Blommaert et al., 2005). Access to English significantly increases opportunities in the job market (Casale & Posel, 2011). In townships, English is perceived as a linguistic resource that most learners aspire to develop competency (Krause-Alzaidi, 2021). Teachers and learners in township schools often have limited exposure to English outside of classrooms, and they aspire to an English that

allows them trans-local mobility and access to employment beyond the township (Blommaert et al., 2005; Krause-Alzaidi, 2021).

Several studies have focused on the relationship between language and mathematics, highlighting the importance of understanding how language is embedded within mathematics (Chitera, 2011; Moschkovich, 2002; Planas & Civil, 2013). The significance of the language preference paradigm in mathematics education has been emphasised through numerous studies that explore the use of language as a resource in learning mathematics (Chitera, 2011; Moschkovich, 2002; Planas & Civil, 2013). These studies assert that learners' language preference is a crucial variable for learning and thinking (Setati, 2008). According to Vygotsky (1989), language is critical for cognitive development as it provides concepts for thinking and a means of expressing ideas and asking questions. Language enables mathematics learners to interact with more capable peers and adults and later with written material, which allows them to share their accumulated knowledge (Parilla, 1995). Pimm and Keynes (1994) argue that teaching and learning mathematics involve reading, writing, listening, and talking, all of which rely on language. The relationship between language and mathematics teaching has been recognised as crucial in the field of mathematics education research, particularly in multilingual classrooms (Barwell, 2016). The ability of mathematics learners to articulate strategies, discuss ideas and concepts critically, and communicate mathematical meaning has become a central focus in mathematics education (Vale & Barbosa, 2023). Studies on the learning of mathematics in multilingual classroom contexts argue that language is central to the learning of linear programming and Euclidean geometry (e.g., Moschkovich, 2010; Setati, 2012). In teaching and learning linear programming, for example, learners must understand the task in order to translate it into symbolic mathematical language to formulate the constraint inequalities (Alex et al., 2020; Graven & Robertson, 2020; Bulos, 2021; Oguguo, 2020).

1.2 Language preferences in classroom mathematics discourses

Preferences for the language of instruction in bi/multilingual Mathematics classrooms in South Africa are determined by pedagogical and political factors (Cingo, 2022). To determine and understand learners' reasons for preferring certain language(s) over others, this study also draws on theoretical literature that explores the influence of learners' expectations regarding their access to Mathematics and the pedagogical language(s) used in Mathematics discussions, in relation to their preference for the language(s) of instruction (Trouche et al., 2023). Darwin and Norton (2023) argue that:

Learners who position themselves in relation to English are concerned with accessing social goods and are influenced by the social and economic power of English. They do not prioritise epistemological access, but instead argue for English as the language of instruction. In contrast, learners who position themselves in relation to mathematics and, thus, prioritise epistemological access, exhibit more conflicting discourses, including advocating for the use of their indigenous African languages as the medium of instruction (Darwin & Norton, 2023).

Some researchers argue that learners who prefer English as the medium of instruction (MoI) are motivated by the desire to access social benefits and gain social and economic power associated with the English language (Katukula, Set & Nyambe, 2023; Irham et al., 2023; Maro, 2022). Several researchers propose that learners who prefer English do not consider epistemological access as a factor (Alvidrez et al., 2024; Tamba & Cendana, 2021; Wang, Hong, She, Smith, Fielding & Lin, 2022). Setati (2006) highlights the political, pedagogical, and social aspects that influence language preferences in bi/multilingual mathematics classrooms in South Africa.

1.3 Factors which determine language preference(s) in mathematics classroom discourses

The decisions about which language to use, how, and for what purposes are politically determined (Mahlambi & Mawela, 2021). A mathematics teacher who is Eurocentrically biased is more inclined

to promote English as a medium of instruction, while an Afrocentrically biased mathematics teacher will be pro-African languages as a medium of instruction (Norro, 2022). Both English and Mathematics are perceived as essential or indispensable tools for attaining socio-economic power and status (Alkan & Ipek, 2023). What this implies is that limited mathematical knowledge and incompetence in English will shut the doors to an individual's ambitions in terms of accessing higher education and employment opportunities.

In the context of the current study, the researchers seek to establish and explore the language(s) utilised and preferred by FET Mathematics learners in Gauteng (township school). English language hegemony is still a reality in South African mathematics education three decades after the dawn of democracy in South Africa. The Language in Education Policy (1997) promotes multilingualism; however, English remains the preferred language due to its epistemological and economic significance. The study explores English language preferences in mathematics learning discourses among high school learners in township mathematical discourse contexts.

To accomplish this work, we have focused on the following two main research questions:

- What are the township high school learners' attitudes towards learning mathematics in English only?
- Why do high school mathematics learners in township schools prefer English as a language of teaching and learning during classroom discourses?

1.4 Problem statement

South African high school learners (grades 10 to 12) are significantly underperforming in Mathematics due to language-related constraints in the teaching and learning process in multilingual classrooms (Asikhia, 2010). Several studies acknowledge that English proficiency leads to mathematics proficiency, especially when English is the medium of instruction (Chiphambo & Feza, 2022). According to Asikhia (2010), mathematics teachers tend to use learners' indigenous African language during teaching and learning. As a result, learners often struggle to understand the English language used in official examination papers, leading to incorrect answers. Despite the fact that the majority of learners are not English speakers, secondary school learners and grades 10 to 12 learners are forced by the education system to use English as the medium of instruction in classroom discussions and interactions (Coetzer et al., 2023; Mahlambi & Mawela, 2021). While most South African parents and learners prefer English as the Language of Teaching and Learning (LoTL) in Mathematics (Graven & Robertson, 2020), Nahole and Haimbodi (2022) argue that classroom discussions using the learner's indigenous African language can be "legitimate resources" that help learners "communicate mathematically." Despite research suggesting that the learner's first language (L1) is a crucial tool in learning Mathematics, teachers, parents, and learners still prefer and argue for the use of English (Ryan et al., 2021). The contradictory and ambivalent scenario described here highlights the central problem that needs to be explored in this study. Furthermore, there is little known about high school mathematics learners' language preferences and attitudes towards the English medium of instruction in mathematics in Tshwane West district township schools of Gauteng Province due to a lack of studies. Therefore, it was imperative to investigate mathematics learners' language preferences and attitudes to make recommendations to enhance mathematical understanding and success.

The analysis of the data in this study is based on a conceptual model developed by Gee (1996; 1999), providing a theoretical foundation. By utilising this theoretical framework, we aim to further explore the language preferences of learners in multilingual mathematical township classrooms. Gee's work is highly relevant due to his perspective on language as inherently political. He argues that language not only serves as a cultural tool for expressing ideas but also as a political tool for projecting a specific identity and engaging in particular activities. In fact, Gee's (1996; 1999) model was previously employed as a theoretical lens in Setati's (2008) study, further supporting its use in our own research.

2. Methodology

In conducting this study, a descriptive quantitative approach was employed to conduct a survey. The use of a descriptive design and survey strategy was suitable for collecting quantitative data and analysing it using descriptive statistical methods. The study was guided by the positivist paradigm, which is a philosophical position adopted by natural scientists who observe and make generalisations about reality in society. Positivism emphasises the importance of objective information, prioritising the analysis of pure data and facts, free from human interpretation or bias (Saunders et al., 2019). Positivism was chosen as the appropriate philosophical framework for this study because it facilitated reliable and valid research (Du Plooy-Cilliers, Davis & Bezuidenhout, 2014). Additionally, this paradigm yields objective outcomes that are not open to different interpretations (Selvan, 2017; Cohen et al., 2018).

The study employed a quantitative descriptive research design of the survey type, focusing on the collection of numerical data for descriptive analysis. Specifically, a non-experimental survey-based cross-sectional research design was used. The study took place between July 1st, 2023, and October 1st, 2023. The descriptive research design was chosen to enable data collection necessary for determining the extent to which English is preferred as a language of teaching and learning in secondary school mathematics classroom discourses. This design was appropriate for analysing frequencies and identifying patterns in the survey responses.

The study population consisted of 35 Township secondary schools in Tshwane West District, Gauteng Province, South Africa. The sample included 105 Grade 10, 11, and 12 mathematics learners from three selected Township secondary schools. Stratified random sampling was used to obtain the mathematics learners who participated in the study. The population for the study comprised mathematics learners with diverse indigenous African languages. To ensure a representative sample, stratified sampling was employed, dividing the population into relevant strata and ensuring proportional representation within the sample (Saunders et al., 2019).

Data collection was carried out through a self-administered paper-based questionnaire, which was coded and distributed through hand-delivery to the target participants. A closed-ended questionnaire was used to collect data, consisting of 13 items divided into two categories. The first category focused on the attitudes of high school learners towards using English as the medium of instruction in mathematics classroom discourses. The second category focused on the reasons why mathematics learners preferred English as the medium of instruction. The questionnaire items were evaluated using a five-point Likert scale, with options ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire also collected data on the respondents' sociodemographic characteristics, such as gender (male and female), age, grade (grade 10, 11, or 12), and indigenous African language (indigenous African language).

2.1 Data analysis

Data collected were analysed using descriptive statistics, percentages, and bar charts to answer research questions. The data were summarised into frequency tables, which helped identify learners' English language preferences and reasons for their language preferences during classroom mathematics discourses.

2.2 Ethical Consideration

Prior to collecting data, the researchers obtained ethical clearance from the Ethics Review Committee of the University of South Africa (UNISA). Additionally, permission to conduct the study was sought from the Department of Basic Education (DBE) head office and Tshwane West District. Data was collected using a survey method for purely academic purposes. Each participant's consent was obtained before collecting their data. Throughout the data collection and analysis process, the

researchers ensured that the participants' identities remained anonymous. Confidentiality was maintained by ensuring that no participant information revealed their identities. To balance risks and benefits, the researchers reported the data in an aggregate form without disclosing individual participants' identities, thus preventing any potential harm to the respondents. The instrument used in the study was tested for validity and reliability to ensure the study's rigour and quality. As the study involved minors, parental assent was obtained prior to commencing the study.

3. Presentation of Results

This section presents the study results, including their analysis and interpretation. The results include the participants' demographic characteristics and descriptive statistics. Data analysis for the study is presented using descriptive statistics of percentages and bar charts to answer research questions. Table 1 shows the sociodemographic data of the respondents.

3.1 Demographic profiles

The study considered demographic profiles, including the gender of the respondents and their grades. The demographic results are presented in Table 1.

Table 1: Sociodemographic data for the participants

Grade	Gender frequency and percentage		
	Male	Female	Total
10	18(37%)	31(63%)	49(100%)
11	12(36%)	21(64%)	33(100%)
12	10(43%)	13(57%)	23(100%)
Total	40(38%)	65(62%)	105(100%)

As revealed in Table 1 above, out of 105 (100%) high school learners sampled for the study, (47%) of them were from Grade 10 (comprising (37%) males and (63%) females), while (36%) were Grade 11 learners, with (36%) being males and (64%) being females, and (57%) females and (43%) males were Grade 12 learners. The data suggest that female learners constituted a large proportion of the sample.

Table 2: Township schools' indigenous African language distribution per grade

Indigenous African language	IsiZulu	Sepedi	Setswana	Tshivenda	IsiNdebele	TOTAL
Grade 10	11(22%)	13(27%)	17(35%)	5(10%)	3(6%)	49(100%)
Grade 11	8(24%)	11(34%)	7(21%)	4(12%)	3(9%)	33(100%)
Grade 12	2(9%)	6(26%)	5(22%)	6(26%)	4(17%)	23(100%)
Total	22(21%)	29(28%)	30(29%)	14(13%)	10(9%)	105(100%)

Table 2 above indicates that learners from the township school have a heterogeneous or multilingual indigenous African language background. Township learners' linguistic environment is made up of five indigenous African languages, excluding English. These findings depict that learners in the township environment come from a diverse and rich indigenous African language environment. The five different indigenous African languages are Setswana, Sepedi, IsiZulu, IsiNdebele, and Tshivenda. The majority of the learners (n=30; 29%) are Setswana Indigenous African language Speakers, followed by (n=29; 28%) who are Sepedi Indigenous African language Speakers, (n=22; 21%) who are IsiZulu Indigenous African language speakers, 2% while (n=14; 13%) who are Tshivenda Indigenous African language speakers, and a few learners (n=10; 9%).

3.2 Answering research questions

Percentage and bar charts were used to answer research questions as presented below.

3.2.1 The attitudes of township high school learners towards learning mathematics in English

This question required the participants to indicate their preferences by responding to three items in the questionnaire. These items were: (1) I prefer to learn mathematics in English; (2) I do not prefer to learn mathematics in English; and (3) I prefer to learn mathematics in both English and the Indigenous African language.

Table 3: Attitude of township learners towards English medium of instruction

Grade	Prefer learning mathematics in English	Do not prefer learning mathematics in English	Prefer to learn mathematics in both English and Indigenous African language
10	29(59.2%)	14(28.6%)	06(12.2%)
11	23(69.7%)	08(24.2%)	02(6.1%)
12	16(69.6%)	07(30.4%)	00(0%)
Total	68(64.8%)	29(27.6%)	08(7.6%)

Table 3 shows the percentage of Grade 10, 11 and 12 mathematics learners involved in the study with respect to their attitude and preference towards the English medium of instruction. The summary of statistics of the trend in English language preference for the three grades is presented in Figure 1.

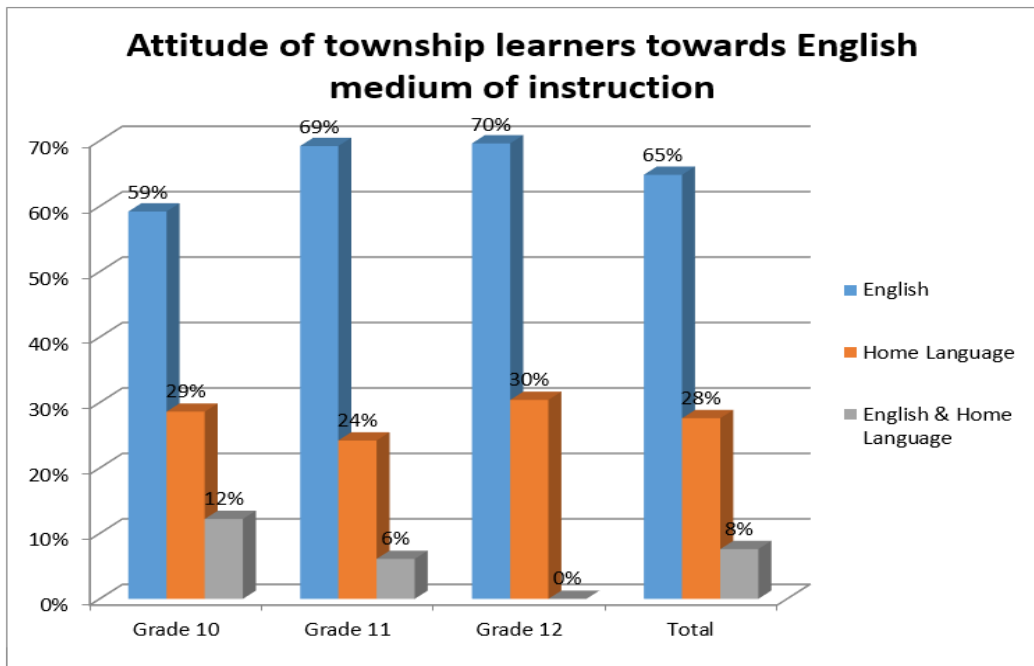


Figure 1: Frequency distribution of the attitude of township learners towards English

The results in Figure 1 revealed that the majority of participants involved in the study preferred English as the medium of instruction. As shown in Figure 1, 59% of Grade 10 learners, 69% of Grade 11 learners, and 65% of Grade 12 learners preferred to be taught mathematics in English. On the other hand, 29% of Grade 10 learners, 24% of Grade 11 learners, and 28% of Grade 12 learners preferred to be taught in their indigenous African language. Translanguaging and code-switching were less preferred, as only 12% of Grade 10 learners, 6% of Grade 11 learners, and 8% of Grade 12 learners preferred to learn mathematics in both English and their indigenous African language. These results reveal that the majority of learners prefer English as the medium of instruction. This suggests that English as a medium of instruction is deeply ingrained in the township schools involved in this

study. Despite the fact that the DBE's Language in Education Policy (1997) and Language of Learning and Teaching (LoLT) policy advocate for learners to be taught in any language, township learners prefer to be taught mathematics predominantly in English. This practice perpetuates the dominance of English in township schools and contradicts the notion that learners should be taught in a language in which they are linguistically competent.

Table 4 below describes the nature of high school mathematics learners towards mathematics in the teaching and learning of mathematics in township schools.

Table 4: Mathematics learners' attitudes towards English medium of instruction by grade

Nature of attitude	Positive attitude towards English MOI	Negative attitude towards English MOI	Subjective/Neutral attitude towards English MOI	TOTAL
Grade 10	29(59%)	14(29%)	6(12%)	49(100%)
Grade 11	23(70%)	8(24%)	2(6%)	33(100%)
Grade 12	15(65%)	6(27%)	2(8%)	23(100%)
TOTAL	67(64%)	28(27%)	10(9%)	23(100%)

Table 4 presents the descriptive statistics for mathematics learners' attitudes towards the English medium of instruction (MOI), including the frequency and percentage of the learners' responses. The results indicate that the surveyed learners have a significantly positive attitude towards English MOI (n = 67; 64%), while (n = 28; 27%) had a negative attitude towards English MOI, and (n = 10; 9%) had a subjective/neutral attitude towards English MOI as they prefer to be taught in both English and their indigenous African language MOI. A highly positive attitude towards English MOI is observed, which is considered normal and justifiable considering the heteroglossic and multilingual nature of the mathematics classrooms in the townships and from the perspective of social and economic mobility associated with English proficiency.

3.2.2 Reasons high school mathematics township learners prefer English as MOI

Table 4 displays the results of the reasons why high school mathematics learners in township schools prefer English as the medium of instruction (MOI). The findings indicate that the majority of the learners prefer English as MOI because they speak different indigenous African languages, and English provides them with a common denominator that enhances equality among mathematics learners. Teaching and learning in the learners' indigenous African languages are negatively and significantly associated with inequality and make the job of mathematics teachers complicated and challenging, as they are not competent in the learners' diverse, multilingual indigenous African languages. Additionally, English as MOI enhances compatibility and reduces the multilinguality, multivoicedness, and multidiscursivity prevalent in the township mathematics classroom.

Table 5: Reasons for preferring English as a language of teaching and learning

REASONS	N	RESPONSES FREQUENCY (%)				
		S/DISA.	DIS.	NEUTRAL	AGREE	S/AGREE.
Because we have more than five different indigenous African languages in our class, and English is a common denominator for us.	105	3(2.9%)	8(7.6%)	1(1%)	32(30.5%)	61(58%)
Because English MOI unifies us in our diversity	105	5(5%)	8(8%)	1(1%)	55(52%)	36(34%)
Because our mathematics teachers cannot speak and	105	11(10.5%)	23(21.9%)	5(4.8%)	49(46.7%).	17(16.1%)

teach in all our different indigenous African languages						
Teaching and learning in our indigenous African languages will increase the level of linguistics inequality among learners	105	12(11.4%)	21(20%)	2(1.9%)	49(46.7%)	21(20%)

4. Discussion of Findings

The findings showed that the majority of the mathematics high school learners in the township significantly preferred to be taught mathematics in English. At the same time, a few disagreed and preferred to be taught mathematics in their indigenous African language or both languages as the medium of instruction (MOI). This finding is supported by the findings of previous scholars, such as Taylor and von Fintel (2016), Ramachandran (2017), Soili (2021), Proby (2021), and Tollefson and Tsui (2018), who reported that English Medium of Instruction (EMI) is becoming more common in multilingual nations where English is not the primary language spoken.

Shinga and Pillay (2021) observed that although the Language in Education Policy (Department of Education, 1997) in South Africa seeks to address the shortcomings of the previous apartheid education system and grant equal recognition to 11 languages, parents, including those of learners in rural high schools, perceive English as a language associated with prosperity and success. Consequently, they choose English as the medium of instruction for their children in the teaching and learning of mathematics. Nevertheless, EMI in mathematics education in multilingual classrooms is a subject of intense debate. In primary education, the existing body of evidence supports the preference for mother-tongue education in mathematics classrooms over English medium instruction. Research has demonstrated that teaching and learning mathematics in one's indigenous African language has a positive impact on cognitive development, educational outcomes, and indicators of human capital formation, such as adult literacy and years of schooling completed (Seid, 2016; Seid, 2019; Taylor & von Fintel, 2016; Ramachandran, 2017). In Africa, particularly in nations where English is the official language, there is a noticeable shift in education language policy towards an early shift from instruction in the indigenous African language to instruction in English as the medium of instruction in mathematics classrooms (Clegg & Simpson, 2016). The findings concur with previous scholars such as Soili (2021) and Probyn (2021), who observed a significant increase in the number of learners enrolled in English-medium education schools.

The findings of the current study showed that English as the medium of instruction is preferred because of its pedagogical and epistemological value. These findings were consistent with what Piper et al. (2016) reported: One of the frequently mentioned factors contributing to the adoption of English as a medium of teaching (EMI) in early primary grades is the belief held by parents and teachers that academic achievement is closely linked to the duration of exposure to English-medium teaching (Piper et al., 2016). Piper et al. (2016) also observed that parents of black African children remain committed to the English language as a medium of instruction as they perceive English as the language that enables their children to attain upward social mobility. They also hold the belief that achieving competence is most effectively accomplished in English-medium classes that offer ample time for focused learning (Probyn, 2021). According to Tollefson and Tsui (2018), it is emphasised that official language policies frequently prioritise the interests of influential factions. Furthermore, even minority groups lacking economic opportunities have been influenced to perceive English as the sole means of achieving upward social mobility.

By and large, the findings emerging from this study revealed that the majority and a few Grade 10, 11, and 12 mathematics learners in the township context prefer to be taught mathematics in English

as the medium of instruction. This preference is mainly due to pedagogical and epistemological reasons, as well as the belief that English is the only language that can facilitate learners' upward social and economic mobility. This means that the hegemony of English as a superior language is entrenched in the mindset of the township learners. Furthermore, in practice, the implications are that mathematics teachers should maintain the status quo and make efforts to improve the linguistic competency of the learners for them to attain mathematics success, which is significantly influenced by the learners' language proficiency in the language of teaching and learning.

5. Conclusions

The importance of language in the teaching and learning of mathematics in South African townships cannot be overemphasised due to the heteroglossic linguistic nature of the township mathematics classrooms. The presence of multilinguality, multivoicedness, and multidiscursivity prevalent in the township mathematics classroom ideally leads to a language shift towards English preference in classroom mathematics discourses (Anthonissen, 2009). The role of language in multilingual mathematics classrooms is felt in different settings in South Africa. The findings of the study in relation to the research questions showed that the majority of Grade 10, 11, and 12 mathematics learners in a township context preferred to be taught and learn mathematics in English due to the heteroglossia linguistic nature of the township schools. These findings are important because they may provide some insights and direction for mathematics teachers to contemplate, particularly in their language practices during classroom mathematics discourses. The findings will help teachers in the township context to understand the language preferred by learners and the motives or reasons behind such a preference. The results are consistent with prior studies that demonstrated that English is the preferred medium of instruction due to the perceived role of enhancing the economic and social mobility of learners who have been subjected to English as a medium of instruction. It is concluded that the language preference of the learners should be harnessed to maximise the acquisition of mathematics content as well as enhance the social and economic mobility of the learners.

6. Recommendations

The study recommends further research to explore the impact of multilingualism and a heteroglossic township linguistic environment on the language preferred by high school learners as the medium of instruction, with the goal of enhancing mathematics achievement and understanding. It is unclear from this study whether the presence of multilingualism, multivoicedness, and multidiscursivity in a township society enhances or diminishes learner performance in mathematics classroom discussions. Future researchers should explore this gap. Additionally, since this study was conducted in a township setting, the language preferred by learners in a rural setting is unknown. Given the multilingual nature of South African mathematics classrooms, adopting English as the medium of instruction would be more feasible to address the challenges associated with teaching in a multilingual classroom. Consequently, language policymakers and the Department of Education can develop a language policy that promotes the use of English as the medium of instruction in mathematics classroom discussions.

Township schools where this study took place are known for their linguistic diversity (Banda, 2018; Deumert, 2013; Krause-Alzaidi, 2021; Mesthrie & Hurst, 2013). Due to the heterogeneous linguistic nature of township schools, English as the medium of instruction is perceived as a neutral language that symbolises upward social mobility and success beyond the township (Blommaert et al., 2005). English is seen as a prestigious set of linguistic resources that many children in township schools aspire to become proficient in (Krause-Alzaidi, 2021). Consequently, English becomes the dominant language in township classrooms, particularly in mathematics discussions starting from Grade 3, and learner and teacher performance is measured based on English proficiency. Overall, teachers and learners strive for English that allows them to have mobility beyond the township and access to employment opportunities (Blommaert et al., 2005; Krause-Alzaidi, 2021).

7. Declarations

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Data availability: Data for the study, while available in the body of the work, could be requested from the corresponding author at a reasonable request.

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