Examining teachers' views on the adoption of mother tongue-based bilingual education in mathematics teaching and learning: A South African context

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Mathematics is one of the critical subjects studied worldwide and is a major for all science faculties and careers. However, it is 1 of the subjects in which performance is poor in all educational phases and bands. Therefore, with this research we aimed to consider the use of mother tongue in the learning and teaching of mathematics in schools. This qualitative research was a descriptive case study conducted in the OR Tambo Inland district, which comprises 2 satellite towns, Mthatha and Qumbu in the Eastern Cape province of South Africa. The focus area for the study was the Qumbu satellite. Twenty-four participants were selected through purposeful sampling. Participants were grouped in 4 focus groups with 6 members in each. An interview schedule guide with semi-structured and open-ended questions was used to collect data. A thematic approach and facts were used for data analysis and presentation. Research shows that the use of mother tongue is beneficial for all learners in all subjects, however, this is not what many teachers believe. We conclude with the recommendation that the broad South African community should be schooled in the value and impact of the use of mother tongue in education or consideration of mother-tongue-based bilingual education (MTBBE). There is a need for South Africans to understand the concept of MTBBE better. It provides advantages such as providing learners with an increased ability to think deeply, to express themselves clearly and to improve academic performance (Stoop, 2017).

Keywords: bilingualism; English second language (ESL); language of learning and teaching (LoLT); mathematics education; mother tongue instruction

Introduction
The language of learning and teaching (LoLT) in South Africa has become a nightmare for South African schools. We have observed that the choice of LoLT negatively influences, not only learning and teaching processes but also schools' images and cultures. In essence, school image and culture determine school enrolment and learner performance. We investigated the use of mother tongue in the teaching and learning of mathematics to learners whose first language was not English. These learners used mother tongue as their second language. Research indicates that more than 80% of children in South Africa learn in a language other than their mother tongue (Tsebe, 2021).

Mother-tongue education is more inclined towards the use of the home language in teaching and learning processes. Each person has a biological language that is attached at birth, the mother tongue. Nishanthi (2020) notes that mother tongue is a language one learns as a baby. Mother tongue, in the context of this article, refers to the language a person grew up speaking from early childhood. This refers to the language that provides an insight into the language environment and structure with basic linguistic structure on how language works as embedded in his or her culture. Cultural structure forms one's views of the world and of others.

As mandated by the Constitution of the Republic of South Africa, 1996, school management teams and school governing bodies (SGBs) are entitled to decide on the LoLT for schools. It is stated in the official language policy that schools must choose a language or languages of learning and teaching. Therefore, schools, through their SGBs, can choose any language (from 11) as their LoLT (Maluleke, 2019). In most schools, English is the preferred LoLT. However, the majority of teachers are experiencing challenges in the use of English as LoLT with learners whose first language is not English. Such challenges can be prevalent because, in our view, this is against the basic psychological principle of good learning from the known to the unknown.

Poor performance in mathematics is probably influenced by language. Maluleke (2019:1) claims that mathematics in South Africa (SA) is characterised by serious challenges because the pass rate is always below the expected level. Planas (2014) highlights that the teaching of mathematics to learners using English as second language (L2) has always presented obstacles to learner performance. Bowie, Venkat and Askew (2019) aver that a lack of language understanding may lead to memorisation and ordinary use of formulas (procedures without connections). In addition, learners fail to read the complex levels of mathematical knowledge, the procedures with connections and doing mathematics.

With this research we intended to address the following research question:
- What are the views of teachers pertaining to the introduction of MTBBE in schools?

Theoretical Framework

In our opinion, learners ought to develop understanding that is embedded in their environment. Such knowledge or mathematical phenomena would link them to a broader knowledge of the practical aspects of the world. This view is elaborated on by Xerou, Papadima-Sophocleous and Parmaxi (2016) who state that constructivism is a theory of learning, teaching and design where knowledge is better constructed when learners construct it themselves. In the same vein, Phuong (2018) avers that social constructivism operates on the basis of promoting teaching through connection, connecting existing knowledge to construct new knowledge and expose learners to different situations.

With reference to the above, we applied the social constructivism theory in this study. Constructivism emphasises that all human beings are engaged in the process of making sense of their lives (worlds); they are continuously constructing, developing and changing the everyday interpretation of their world(s) through social interaction (Babbie & Mouton, 2012).

Cultural context also involves language; that is why social constructivism is relevant to guide this study. We considered social constructivism as the most suitable theory for this study as it deals with learner performance, which is a dynamic phenomenon and a progressing construct. The above argument is in congruence with Vygotsky, one of the pioneers of social constructivism as quoted by Nel, Nel and Hugo (2013:11), who claim that life experiences and reflections are closely linked to a person's social, historical and cultural contexts.

From literature, we have also construed that there is still a great debate on the impact of the LoLT in mathematics. Consequently, the debate is centred on the choice of the LoLT between English and the learners' mother tongue. Naudé and Meier (2014) argue that in most South African schools, the preferred LoLT is English. Noticeably, most schools choose English and not the African language spoken in the area (Manyike & Lemmer 2014; Wildsmith-Cromarty & Balfour, 2019). Maluleke (2019:1) similarly argues that most parents prefer their children to learn through the medium of English. We have also observed that, in most schools in our area, the favoured language for teaching is English.

Piper, Zuikowski, Kwayumba and Oyanga (2017), who conducted a study in Kenya, observed that the issue of language of instruction is central to the debate around improving instructional quality and student achievement in multilingual countries. The findings of their study, based on Primary Mathematics and Reading (PRIMR) for assessing English, Kiswahili and mathematics, seem to suggest that mother-tongue literacy instruction is helpful, or at least not harmful. However, parents, employment agencies, business sectors and higher educational institutions (HEIs) resist the implementation of mother-tongue instruction because they fear that it will somehow harm students' acquisition of English and other subjects (Piper et al., 2017).

In a study conducted by Mokibelo (2014) in Botswana, it appears that Setswana as mother tongue is used as the language of instruction in linguistically complex primary schools. The dilemmas it presents are equal to those in other African countries that experience challenges with teaching and learning. Mokibelo's (2014) findings affirm that learners whose mother tongue is not Setswana are challenged when taught in Setswana. This assertion clearly confirms the significance of mother tongue for learners in the learning and teaching of subjects. We assert that it is in this milieu that code switching becomes an alternative to try to bring about effective mathematics teaching.

The concept of bilingual (or multilingual) education on learning and teaching

Essien (2010:33) argues that in a classroom of learners whose mother tongue is not the LoLT, teachers are faced with a triple challenge. Teachers have to strike a balance between attention to mathematical content, English as LoLT and mathematical language. Eakle (2013:109) suggests that a solution to language or cultural loss has been bilingual education. He believes that knowing multiple languages adds to a child's cognitive ability.

Our observation was that bilingualism has traditionally been used in South African schools. The intention with bilingual education was to ensure the use of African languages as subjects that carry learners' personal values. Such languages serve as a link between school and home or between learners and parents.

Research indicates that mother tongue has its advantages in the teaching of all subjects, including mathematics. A person's basic thinking is generally aligned to one's mother tongue. Nishanthi (2020) proclaims that mother tongue is vital in framing people's thinking and emotions in enhancing cognitive development and supports learning of other subjects. We may argue that mother tongue bridges thinking in two or more languages used.

When mother tongue is not used it has quite clear disadvantages that negatively impact learner performance. Kioko, Ndung'u, Njoroge and Mutiga (2014) argue that when mother tongue is not used learners get frustrated listening to language they do not understand. Secondly, low levels of learner attainment and high learner dropout becomes ostensible. On the other hand, mother tongue is vital in the framing of people's thinking and

emotions. The mother tongue links a person with his/her culture and enhances learners' cognitive development as it supports the learning of other subjects (Nishanthi, 2020).

Language of learning and teaching (LoLT) and the mother tongue

We have observed that the issue of language in teaching mathematics is a complicated one in all parts of the world, particularly when there is a lack of mutual intelligibility of languages. In the African milieu, the case in point is the example of Nigeria where 250 indigenous languages are spoken. All 250 languages are autonomous in the sense that they share very few (if any) common vocabularies (Essien, 2010). In that situation, it would be very difficult to decide on the indigenous language to be used as LoLT. The situation in SA, the "Rainbow Nation", is similar, as many languages are spoken here. We foresee the greatest challenge will be around the classification of languages in the near feature.

Research shows that children's first language or mother tongue is the optimal language for literacy and learning throughout primary school (Sibanda, 2019). Bilgin (2016), in a study conducted in Turkey, recommends that students should be allowed to use home language until they feel comfortable using only the preferred L2, which is English. However, Kioko et al. (2014) observe that Africans have a misconception on the value of mother tongue and that policy makers are not yet convinced of the necessity of mother tongue, which may not be ignored.

Lee, Quinn and Valdés (2013) state that the greatest challenge faced by teachers is how to support learners in building connections from everyday language to mathematical discourse in the classroom. Mashiya (2011) postulates that the language that children know best when they first enter school should be recommended as LoLT. By extension, it means that the mathematics curriculum or education should be flexibly designed in the mother tongue as well as in other official languages. The aim is to accommodate learners and teachers based on their diverse content knowledge and different geographical backgrounds. Learners could also benefit from such mathematics curriculum design that embraces the transversioning or code switching in their learning process (Mashiya, 2011).

We have observed that in the academic sphere, the youth lack creativity and critical thinking due to modes of thinking and interpretation of thoughts. Language links emotions and actions. We align this challenge with the decline in persons' natural instrument of thought, the use of their mother tongue. This challenge limits most advantages of the use of the mother tongue. Such include, expressing one's views,

developing of critical thinking, developing of family bonds, cultural expression, profound ethical dissemination, setting development for learning additional languages, et cetera.

Bunch (2013) states that an English class may present a diverse population of learners from diverse backgrounds. Diverse backgrounds or multiplicity in a class include language and literacy background, socio-economic status and pre-formal schooling. From our experience as teachers we have observed that the family relations of learners in the majority of public schools in rural areas were poor and illiterate, while only some learners were from affluent families. Such variation effects learner performance. We noted that learners from affluent and literate families tended to perform better than those from poor backgrounds. This may be associated with the availability of resources to fund and support learners' academic needs. Without a doubt, it is clear that human and material resources are crucial in learner performance.

A number of researchers such as Anastassiou and Andreou (2017), Cheng (2013), McLachlan (2018) and Sondang and Bonik (2018) have shown that there are great merits to using mother tongue as the medium of instruction in education. The argument is based on the theory that children who learn to read and write in their mother tongue do better at learning than children obliged to learn to read and write in an L2. As studies in Kenya, Botswana, SA, Malawi and Mali have shown, mother tongue instruction is the best policy (Mufanechiya & Mufanechiya, 2011).

McLachlan (2018), from her study in North Carolina, posits that home language (L1) has a valuable place in L2 acquisition and is a crucial part of learners' zone of proximal development (ZPD). She further states that ZPD is important for the interactional dimension of language learning. Plüddemann (2015) asserts that there is international consensus that the educational use of a child's mother tongue is, in most cases, a necessary condition for successful learning.

As teachers, we concur with the view by Simasiku (2016) that mother tongue is conducive to the correct understanding of the new target language (English in this case), for explanation and elaboration of concepts. The aforementioned authors further argues that the use of the mother tongue increases classroom participation, good relationships and the smooth running of lesson that lead to creating connections with the learners' local culture.

Influence of learning processes in mathematics and current trends to the future

Learning processes in mathematics and current trends should be considered to determine future practices. However, one may note diverse findings from studies on learner performance in

mathematics. Primarily, international studies often show that SA has the worst educational outcomes of all middle-income countries (McCarthy & Oliphant, 2013:3). We do worse than many low-income African countries as shown in The Trends in International Mathematics and Science Study (TIMSS) 2011 (McCarthy & Oliphant, 2013:3). The study of a key subject such as mathematics cannot be limited to any single area or career; hence this subject influences the universal economy. Udofa and Udo (2013) argue that globalisation processes link education to technological and economic development. Above all, education has unified the world into one village with common socio-economic, political, cultural and educational systems. Udofa and Udo (2013) claim that mathematics education is regarded as critical in debates around the world, as mathematics is universal to all countries' ecospheres, particularly with regard to technological advancement. In addition, as researchers we view mathematics as a subject with potential to bridge any gaps in the world developmental agendas.

Mathematics and science have a special role to play in global economic developments such as the rise of the Fourth Industrial Revolution (4IR). 4IR seems to project the lessened role of a teacher becoming a facilitator rather than a conduit of knowledge. Sousa, Karimova and Gorlov (2020) claim that in developed countries like China and Russia, the role of a teacher is equated to that of a robot. However, we have noted that the coronavirus disease (COVID-19) has shown that parents lack the potential to be reliable substitutes for teachers and many students have little access to technology at home. COVID-19, which has induced home schooling, has proven that teachers are still very necessary.

With the understanding of the global importance of mathematics, one cannot ignore the necessity of adopting current trends in learning based on electronic learning strategies. We believe that learning and teaching methods ought to keep up with the drastic and dynamic technological changes.

Methodology
In this section we discuss the research paradigm, research approach, the design, the sampling method, the research instrument, and the procedures followed to collect the data. The ethical requirements followed are also presented.

Research Paradigm
A research paradigm in a study is defined and chosen based on its ontology, epistemology and methodology (Patel, 2015). Don-Solomon and Eke (2018:1–2) argue that both objectivism and subjectivism that are part of ontology should be

interpreted in a study. The acquisition of knowledge is through the epistemology of the study. Nkuda (2017) opines that epistemology connotes the creation and acquisition of knowledge. We acquired knowledge by reading pertinent literature on the phenomenon being explored. In this research, epistemology portrays an intertwined relationship between three aspects: reality, mind and knowledge. Based on these co-existing aspects, constructivism was used.

Research Approach
The qualitative research approach was used in this research. Schoeman (2011:12) asserts that qualitative research aims to study participants' experiences and perceptions of their social world. Schneider, Coates and Yarris (2017) argue that qualitative methods, applied from the social sciences, are well suited to understanding social phenomena. It is against this background that we chose a qualitative research method. We believe that the qualitative design supports the premise of this study.

Research Design
We focused on a descriptive case study as the most appropriate research design. Alshenqeeti (2014) declares that a case study, in conjunction with the advantage of interviews, provides a detailed description of individuals and events in their natural setting. One of the characteristics of a case study is that a single person or a few people can be studied in great depth. One advantage is to study their complexity and consider their specific characteristics in trying to understand behaviour (Beins & McCarthy, 2018).

Sampling Method, Research Site and Sample Size
This research was conducted to look at the use of mother tongue in mathematics education in selected schools. A qualitative case study methodology was used to select 24 participants from a pool of teachers in Mthatha and Qumbu. The purposeful sampling method was used to select 12 teachers from rural schools and 12 from urban schools. For interview processes, four focus groups, each consisting of six primary mathematics teachers, were formed. Focus groups are chosen when the researcher believes that the whole of a group's experiences contributes more to understanding a social phenomenon than the experience of a single individual (Schneider et al., 2017).

Research Instrument Used and Procedures Followed to Collect the Data
In this descriptive case study we chose to construct an interview schedule as a data collection tool. This implies that interviews were used to collect data from the sampled mathematics teachers.

May (2011) defines interviews as a method of maintaining and generating conversations with people on a specific topic or range of topics and then interpreting the resultant data. Many researchers have highlighted the value of interviews. Young, Rose, Mumby, Benitez-Capistros, Derrick, Finch, Garcia, Marwaha, Morgans, Parkinson, Shah, Wilson and Mukherjee (2017) attest to the value of interviews as they agree that interviews are flexible and allow in-depth analysis.

In this study we used semi-structured interviews. Alshenqeeti (2014) notes an interesting point on semi-structured interviews – events are not often directly observable and talking to people is one of the most effective methods for attaining and exploring key constructs in research. This is the most used type of interview in qualitative research.

One of the advantages of using semi-structured interviews is that the interview provides a type of framework in which the practices and standards are not only recorded but also achieved, challenged and reinforced (Jamshed, 2014). In the same vein, Young et al. (2017) aver that one of the greatest advantages of interviews is that face-to-face, verbal exchanges, group exchanges and internet or telephone surveys are possible with interviews.

In our opinion, the interview is the best method for collecting data from people. People are not coaxed during interviews. They voluntarily speak their minds about the phenomenon. Interviews are special in dealing with people. Adhabi and Anozie (2017) aver that interviews are distinct from other methods as their unique features make them superior. Young et al. (2017) also argue that interviews are preferable to other methods in filling a knowledge gap, particularly if complex behaviour is being investigated.

Data Analysis
In analysing data, we employed transcriptions followed by segmentation and then coding. Transcription is transforming qualitative data into typed text. Segmentation entails dividing data into meaningful analytical units. In qualitative research, analysis involves the process of breaking data down into smaller units to reveal their characteristic elements and structure (Gray, 2018).

Data were organised and analysed into a format that summarised the main findings quickly and easily. Summaries are intended to answer the research questions. We summarised collected data and completed the interpretation of data using analytical patterns and logical reasoning to determine patterns, relationships or trends. The final report is presented in a thematic, narrative report with conceptual descriptions and direct quotations from research participants' responses.

Ethical Measures
In ensuring ethical considerations, the following aspects were in place. Permission was sought from the participants, ensuring anonymity and confidentiality and ensuring protection against the violation of their rights. Van Rensburg, Alpaslan, Du Plooy, Gelderblom, Eeden and Wigston (2009) argue that ethics are the standards according to which a community agrees to regulate their behaviour. It is imperative that researchers follow ethical standards (Beins & McCarthy, 2018:28).

Adhabi and Anozie (2017:93) argue that the sole purpose of ethics in scientific studies is to govern the uncertainties and challenges that could be faced by both the participants and the researcher. They further state that it is necessary to put in place distinct guidelines to be followed to avoid ethical repercussions. We strongly agree with the guidelines to counteract any unanticipated emotional reactions. Ethics, in research, have been developed against the background of professional codes of conduct and laws governing a country. There are three ethical issues: doing no harm, obtaining consent and ensuring privacy (British Sociological Association [BSA], 2017).

As we are permanently employed we were limited by time and funds to access all the places that we would have wished to visit for the study. To limit the impact of the above we decided to use focus groups instead of individual interviews. For data collection we conducted interviews with 24 Grade 6 teachers from the chosen primary schools in urban and rural areas.

Results
Teachers were asked the question: What are your views pertaining to the introduction of MTBBE in schools?

Focus groups are categorised as Township-focus group 1 (T-FG 1), Township-focus group 2 (T-FG 2) and Rural-focus group 1 (R-FG 1) and Rural-focus group 2 (R-FG 2) representing township and rural schools respectively. The teachers' views are presented in the following themes.

Teachers' Views on the Introduction of MTBBE
One group of teacher participants clearly did not see a need for the introduction of MTBBE. In showing their dissatisfaction towards MTBBE, teachers gave a number of reasons. They regarded MTBBE as placing the children of the country in some form of slavery. It is a way to isolate South African learners from international education. Teachers believed that MTBBE had no place in SA, particularly regarding the 4IR. Moreover, they

felt that SA was progressing towards being a developed (though still a developing) country so MTBBE would mean regression for the country. They believed that it would make the South African people poorer.

One teacher, R-FG1 (from a school where MTBBE was being piloted) claimed:

We do not support MTBBE because
Firstly, there is no material for MTBBE,
Secondly, MTBBE is a problem when it comes to assessment. We struggle every time during formative evaluation with English papers whilst learners study in IsiXhosa,
Thirdly, we have a great concern about the future of our learners as we are not sure of any high school that is ready to teach through MTBBE, neighbouring high schools have continually shown less interest and have indicated that they will not implement MTBBE.
Fourth, it deprives communication and brings division amongst teachers.
Fifthly, problem of education system in our country in that we always copy things from other countries. For example, we copycat the Russian style of mother tongue whereas we do not know how many languages are there.
Finally, South African government is not ready to fully fund education, yet MTBBE is very expensive.

From the data, it is evident that teachers had serious reservations about MTBBE which resulted in them opposing the implementation of MTBBE. From what the teachers said clearly showed that they believed that MTBBE was just another way to undermine and derail progress in the Eastern Cape. Focus groups further recommended code-switching (opposed to MTBBE) as the best solution to the language problem. In essence, code-switching is regarded as an international phenomenon that has been proven effective.

T-FG1 claimed the following:

I have been teaching for the past 24 years and there has never been this much pressure and concentration on the language of teaching and learning. We used to use both English and IsiXhosa inter-changeably based on the need. We have produced many qualified students to date. In the 1990s we had Standard 7 (STD 7) currently noted as Grade 9 with externally set examinations and the results were there.

Basing his view on historical analogy, R-FG1 said the following:

The Department of Education is taking the country back to colonisation but in an African sphere. We need to look broadly on this introduction of MTBBE; we must not only put our attention in mathematics as a subject but also to other developmental spheres of life. For example, developments like Fourth Industrial Revolution (4IR) and other technological advancements could leave the country behind due to language barrier.

R-FG1 proposed the following provisos for the introduction of MTBBE:

- *If MTBBE is introduced, it must be maintained throughout the system of education.*

- *MTBBE should be introduced in all levels of education, ensure that it starts from Grade 1 to Grade 12. Moreover, there must be a clear plan for tertiary education.*
- *Universities must also use the same policy on language.*
- *Practise MTBBE in universities.*
- *What the country should do is what is being done in other countries. No country lives in isolation.*

In support of MTBBE, R-FG2 agreed that it would work for SA as it had for other countries like China. He argued:

By the way, some of us were taught mathematics in IsiXhosa in the lower grades. English came only in Standard 6 (currently Grade 8) and we mastered English well at a later stage or level. Why then, cannot we consider those experiences and understand that basics are key in mathematics more than language used.

In closing the debate, R-FG2, presented an opposing view:

We fully recommend the implementation of MTBBE for improvement of education in South Africa, just as other leading countries that teach their children in their mother tongues. For that matter, here in South Africa, learners with mother tongue in English or in Afrikaans are at an advantage as their papers are written in both English and Afrikaans. Why can't the indigenous language speakers be given the same opportunity?

MTBBE and Learners' Future

The majority of teachers were of the opinion that there was no future for learners who were subjected to MTBBE. The greatest concern raised by teachers was why MTBBE was not implemented in the whole of SA. None of the teachers knew about any tertiary institution that subscribed to this ideal. In the teachers' opinion the worst was the number of high schools that were refuting the idea.

T-FG1 claimed: "*We were informed by the subject advisors about MTBBE and on the other hand they always wondered as to where are those learners to whom this MTBBE was piloted in Cofimvaba district?*"

In agreement, T-FG2 stated: "*I understand that MTBBE had been introduced in Grade 6 but it had brought controversy in that there was no clear direction as to where these learners would be admitted the following year from schools without Grade 7, Junior Primary Schools (JPS) and beyond primary schooling from Grade 8 up-wards.*" With regard to T-FG2's view, R-FG1 added, "*Teachers in rural schools who are doing MTBBE are complaining that no high schools show willingness to practise MTBBE.*"

T-FG1 agreed:

As teachers we are not sure about the future of learners who were doing MTBBE. We are doing it in my school but we continue asking as where are these learners going to do their Grade 8 as no near-by high school is ready for this programme.

R-FG2 noted that:

> [l]*earners battle to spell these concepts as they grow. There is no linkage, in most cases, between pronunciation and the written text. There is no uniformity in translation of words. Most concepts do not have native words; that is the reason for borrowing most of the English mathematics words.*

In considering globalisation and the educational impact, teachers believe that the introduction of MTBBE will cause great damage. Primarily, each country wants to develop globally. English, a global language, is crucial for global influence and communication. Teachers further argued that the international world does not cater for individual interests. Teachers' ideas are based on the feeling that the introduction of MTBBE was a clear strategy to heist the country's will towards globalisation.

T-FG1 argued as follows: "*MTBBE does not prepare learners for the entire world and they will be misfits. It is going to lead to numerous challenges like, testing is going to be a problem, there will be too much work for teachers, schools do not want it.*" T-FG2 added: "*We want independent people who would not need interpreters and translators in order to do their work.*"

T-FG2 further argued:

> *English is an international language that caters for everyone and every nation. I wonder if the country is not regressing if the entire world is being globalised and on the other hand South Africa is trying to isolate herself through language.*

In the same vein, R-FG2 claimed that "[t]*he world is operating in the Fourth Industrial Revolution (4IR); I wonder if it would be easy for South Africa to operate at an international platform with her indigenous languages.*"

R-FG1 further proclaimed:

> *MTBBE may be good but I think it is too late for the provincial implementation. Our country is a democratic country; it is a rainbow nation and is where all nations are allowed to be part of any developmental programmes and systems including education. To me, there is no value for MTBBE in a country like South Africa that has 11 official languages.*

R-FG2 argued: "*Maybe MTBBE would appear feasible for the Eastern Cape because only two languages, IsiXhosa and Sotho are dominant, but I foresaw* [*sic*] *greater challenges in bigger provinces where there are many tribes with different home languages.*"

T-FG2 also highlighted:

> *We need to not only focus on indigenous languages because of the different nationalities currently residing in South Africa. We ought to take note of even other nations that interact with South Africa in various spheres. We need clear channels of interaction through universal language. We are becoming self-centred by focusing on our interest and not consider international operational prescripts.*

MTBBE Resources and Their Challenges

Participants raised the issue of resources as one of the main reasons to oppose the introduction of MTBBE. Schools that have implemented MTBBE were desperate for resources that are not forthcoming, including textbooks, assessment tools, and workbooks. Teachers also indicated an expansive need to re-skill teachers. Currently, it is a struggle just to train the few for the pilot programme. Above all, not many teachers buy in to the philosophy of MTBBE.

T-FG2 maintained that "[r]*esources make learning fun and greater understanding is highly achieved when learning is more practical. Resources make learning to be more learner-centred. Without resources, it is hard to detect understanding.*"

T-FG1 added: "*In my thinking training is too minimal for now and both groups, subject advisors and teachers, must be thoroughly trained in MTBBE.*"

R-FG2 maintained: "*As teachers, we do not see a need for the introduction of MTBBE and I feel it was just a waste of time and destruction of learners.*"

R-FG1 agreed: "*It is already difficult for our learners to be admitted in universities due to poor performance in both English and mathematics. This MTBBE is going to make things eviler* [*sic*] *than before.*"

Based on the above we may argue that the majority of teachers do not foresee success and proper implementation of MTBBE. In addition, we noted that not all of the teachers in the focus groups were implementing MTBBE but, on their own, teachers have learnt a lot about MTBBE. Teachers have different perceptions, of which some are negative, about MTBBE. Among others, they include a blurred future for MTBBE; teachers did not see a future for MTBBE learners as there seemed to be no high schools ready for learners emerging from the programme, no proper training for teachers to implement the programme and then there is the dilemma of too many indigenous languages.

Discussion

Based on the theoretical framework, reading, writing, speaking, basic counting and elemental analysis are all entrenched in sociocultural practices of various communities. We, therefore, view social constructivism as a language-embedded practice. We strongly agree with social constructivists that what is learned is always social and therefore, all knowledge carries social and cultural meanings (Dudley-Marling & Burns, 2014). However, teachers, as educated people, see little value in mother tongue instruction as they

uphold the use of English as LoLT. Therefore, teacher's beliefs contradict the social constructivist theory.

Teachers have a holistic view on Mother Tongue Based Bilingual Education (MTBBE). Teachers query how this view of MTBBE could be applied in only one province of the country while the Department of Basic Education (DBE) is responsible for school education in all provinces. There is great uncertainty as to whether the idea of MTBBE as introduced by the DBE has been welcomed by all provincial departments of education. This improbability emanates from the fact that it is only the Eastern Cape Department of Education (ECDoE) that has already piloted and started practising MTBBE. It is in this context that Eastern Cape teachers are opposed to the motive behind MTBBE. They feel that their province is regressing instead of progressing.

Above all, the DBE has an obligation to support education in the country. The challenge is increased by the resources to be provided by the DBE as, presently, DBE workbooks, supplied by the national department, are written in English. Besides, most developments that appear to be good and are practiced in other countries may not be functional in SA because of financial constraints and the multiplicity of official languages. The absence of a substantial budget is a major challenge in implementing MTBBE throughout the entire country.

In addition, teachers believed that parents were not in favour of African languages as LoLT in schools, as shown by them sending their children to schools where English is used as LoLT. On the other hand, research has shown that the use of mother tongue is beneficial to all learners in all subjects. Nkonde, Siluyele, Mweemba, Nkhata, Kaluba and Zulu (2018) highlight that when children are taught content subjects in their mother tongue their test scores are higher than when an L2 is used. Secondly, mother tongue frees children from a lack of confidence and rote learning.

The majority of participants in this study rejected MTBBE uncompromisingly. Their argument portrayed MTBBE as an obstacle to learners' future success and as such did not have a place in the dynamic and global world. Teachers who were employing MTBBE in their schools further claimed that they were never trained in MTBBE when they were trained as teachers.

Also, teachers based their opposition on a number of reasons, such as the number of indigenous languages in SA that could make MTBBE too expensive to implement. In addition, teachers thought that indigenous languages would be classified according to ethnicity to pick those that could be used as LoLT in schools. This was attempted by the Nationalist government during the apartheid era when Afrikaans was made a medium of instruction, leading to the riots of June 1976. Malindi, Gobingca and Ndebele (2023) argue that, presently learners study indigenous languages as subjects, not as a medium of instruction for all other subjects. We think that the idea of refuting mother tongue is totally in contrast with social constructivism in that any learning should be based on a sociocultural background. Language, home language to be precise, is an integral part of culture.

Secondly, most participants believed that MTBBE would produce learners that are less employable. The intention of any country's education system is to produce internationally competent and recognised citizens. However, with MTBBE, the South African education system would yield learners who would not be able to connect to the international context. Furthermore, due to globalisation English has become a universal language. Above all, technological advancements are transferred to other countries through English. Teachers believed that even the 4IR was disseminated to other countries through English.

For now, it is not clear how language would affect digital technological practices. However, social constructivists regard education as a priority towards improving the competitiveness of national economies in the context of increasing globalisation (Sousa et al., 2020). Sousa et al. (2020:2) note that with globalisation there will be new developments in artificial intelligence and that is why artificial intelligence (AI) is a mathematical code based on certain algorithms which influence the way people think and respond. We think that more has to be considered regarding language and technology as the study participants repeatedly highlighted 4IR and globalisation in the context of language use.

Only a few members from rural schools in the focus groups saw a need for MTBBE. Their argument was with reference to political underpinnings. Indigenous languages are not different from English and Afrikaans. The two languages have been used for formal assessment. Teachers claimed that English and Afrikaans learners have been advantaged; as a result, they performed well in mathematics as they were taught in their mother tongue. Bernardo, Aggaboa and Tarun (2018) claim that teachers think that the Mother Tongue Based-Multilingual Education (MTB-MLE) programme may prosper even if learners have different home languages and that education should start from where the learners are and what they already know.

Our view on the issue of MTBBE is that we need to be less engrossed in terminology and insufficient funds and, instead, pay more attention to the lack of a positive attitude among politicians, African educationists, parents and policymakers. As South Africans, we need a positive frame of mind to visualise the impact and need for our

languages. Although the language of a minority group, English, has become the LoLT, the aforementioned stakeholders' positive attitudes have led to its successful implementation. We share the same sentiments as expressed by Gacheche (2010) that success in this area may need greater resource allocation, political will and clear policy objectives. Beka (2016) agrees that successful mother-tongue instruction depends on people's attitudes towards it.

Conclusion and Recommendations

We noted that teachers questioned the introduction of mother-tongue instruction although it is key in building a strong individual identity and people who are decisive in their thinking. Mother tongue links one's identity, culture, history and heritage to one's personality. The use of mother tongue is highly recommended by social constructivists. Therefore, mother-tongue instruction for various schools should take priority when the school community decides about a school's LoLT. Other aspects should follow the prioritisation of mother tongue. It also appeared that English not necessarily influenced learners' intelligence quotients (IQs), nor did it show whether one was highly educated.

We recommend that the South African school community should be fully informed about the value and impact of the use of mother tongue in education and should seriously consider the use of MTBBE. Moreover, we suggest that the government should take responsibility to educate society on the implications of the use of mother tongue in learner performance. It seems that societies are more concerned about the end rather than the means to the end. This has led to a high drop-out rate of learners from the Further Education and Training band. School learners and tertiary students who cannot cope with mathematics do not envisage a brighter future. Others mainly cope through code-switching.

To the ECDoE, we would strongly support cascading of the idea of MTBBE to all education stakeholders. Community mobilisation has to start with the key role players in education, the teachers and parents. ECDoE should work towards gaining the enthusiastic support of stakeholders to avoid societal dissatisfaction and consequent negative attitudes towards the MTBBE programme. From the research it is evident that the teachers and parents did not recommend MTBBE, basing their arguments on numerous unfounded explanations.

We recommend that for mother-tongue teaching to be effectively implemented, SA needs robust and determined decisions and less focus on global discourse, instead of following China's example. The findings of this study show that some of the interviewed teachers implied that mother-tongue teaching was effective. Based on the above, we highly recommend teacher-training programmes that would combine mathematics with home languages. Ideally, mathematics should be combined with each of the home languages as major subjects, depending on the provinces, in the professional development of current teachers and teacher trainees.

We understand that most teachers and parents are biased towards English as the global language to provide for the needs of the learners. Nevertheless, we would applaud the re-thinking of the concept "mother tongue." In so doing, we need to respond to these questions:

- What is the value of the mother tongue?
- Why are learners so responsive and attracted to hearing the teacher speaking their mother tongue or home language?
- Why are other societies so pleased to see and hear their mother tongue being used by educators in their countries?
- What impact does mother tongue instruction have on human thinking and developing creativity and critical thinking?

We pose these questions to show the pervasive relationship between mother-tongue instruction, the scientific application of mathematics and general development of scientific inventions. The world is experiencing the 4IR, and most inventions are likely to come from countries with scientists and entrepreneurs who think in their own mother tongue and are confident to initiate innovations by working from a deep knowledge base using their own languages.

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Authors' Contributions

All authors conceptualised the article, BZG conceptualised the methodology, ZM collected the data, CN analysed the data, ZM produced the first manuscript draft. All authors contributed to the review of literature, discussion of findings and reviewed the final manuscript.

Notes

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