

# EXPERIENCES ON THE DEVELOPMENT OF AN INDIGENOUS AFRICAN LANGUAGE SCIENTIFIC REGISTER FOR NATURAL SCIENCES: A FOCUS ON CHALLENGES, OPPORTUNITIES, AND PERCEPTIONS

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## Abstract

This is a qualitative interpretative case study. The aim of this article is to elucidate the experiences on the development of an African indigenous language (IsiNdebele) scientific register for natural sciences. Interviews and a diary were used to collect data from stakeholders. The results of the study reveal that isiNdebele is still underdeveloped as it lacks scientific terms and different perceptions held by stakeholders on the use of isiNdebele scientific language register to teach Natural Sciences. Some stakeholders are in support of the use of the isiNdebele scientific language register to teach Natural Sciences as learners will be able to learn in their mother tongue which could be beneficial to them. However, with all the research findings on the benefits of using mother tongue as a medium of teaching and learning in South African schools. There are still stakeholders who are not in support of using isiNdebele scientific language register as they still prefer English as a medium of instructions due to its state and being a language of economy and power. Their perceptions further determine and threatens the survival of these indigenous languages. It is therefore recommended that scientific language registers be developed in indigenous languages. With these scientific languages registers in indigenous languages being developed stakeholders might change their perceptions on the use of African languages as languages of teaching and learning.

**Key words:** *isiNdebele, Scientific language register, Natural Sciences, Development.*

## Introduction

Africa is the second largest continent in the world both by population and land area. Linguists estimate that nearly 2,000 native languages are spoken in this continent. With researchers arguments that learners learn best when using their mother tongue, in Africa that is not the case as it is still the only continent in the world where most formal education is conducted using languages that are foreign to most learners and teachers (Oyoo, 2017). The foreign languages used in this continent are the languages of the former colonial masters. The dominant foreign languages in this continent are English, French, Spanish and Portuguese (Brock-Utne, 2014). South Africa is one of the 54 countries in Africa which is still using foreign languages as a medium of instruction, mainly which is English (Motloug, Mavuru & McNaught, 2021).

South Africa is characterised by diverse cultural and ethnic groups, with each group having its own unique language, enabling individuals to share a sense of belonging and cohesion (Motloug et al., 2021; Gudula, 2017). Furthermore, South African schools consist of diverse learners from different cultural backgrounds (Feez & Quinn, 2017). Diversity in this country is not catered for as teachers are often required to teach using registers which are not written neither in their home language nor learners home language particularly in rural schools (Motloug et al., 2021). Thus, the process of teaching can be a monumental challenge, especially when teaching learners using the language, they are neither familiar nor competent in.

There are 11 official languages that is, nine indigenous African languages: isiNdebele; seTswana; sePedi; seSotho; tshiVenda; siSwati; isiZulu, xiTsonga and isiXhosa have been added to English and Afrikaans as official languages in South Africa (Oyoo & Nkopodi, 2020). As provided for in the Constitution, everyone has the right to education in the official language of their choice. Despite this constitutional provision, the language of learning and

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teaching (LOLT) in all schools above Grade 3 including all secondary schools in South Africa is either Afrikaans or English and all the teaching and learning resources beyond third grade are written in these two languages which makes the constitutional provision a “paper policy” (Oyoo & Nkopodi, 2020).

The issue of language has long been a source of contention in South Africa. Several research studies on the use of English as a medium of teaching in South African schools have been done (McKinney & Tyler, 2019; Mweli, 2018). These studies indicate that language proficiency is another impediment to learners achieving well in Natural Sciences (Adesemowo, 2017; Oyoo, 2017). Roy-Campbell (2019) and Motala (2014) contends that since English is the medium of teaching in South African schools, learners are compelled to be competent in the language. According to van Pinxteren (2022), studying any topic in a second language, particularly the sciences, has been shown to be harder and more difficult for learners whose native language is not English. According to culturalist Professor Pitika Ntuli, language may not only be the optimal medium for teaching and learning science, but it may also be a significant barrier. The Minister of Basic Education Angie Motshekga, when answering a parliamentary question and answer session on Wednesday, (March 9, 2022), noted that one of the biggest reasons why South African children have such poor reading comprehension skills is that they are essentially learning in a foreign language by being taught in English (Writer, 2022).

Irrespective of the challenges English poses in South African education it is still maintained as a medium of instruction due to the lack of indigenous language teacher training and an unavailability of indigenous language teaching and learning materials (Phiri, Kaguda & Mabhena, 2013). The lack of these resources makes the adoption of indigenous languages as LoLT in South African schools almost difficult. These difficulties are exacerbated by parents' aversion to the use of indigenous languages as LoLT. They prefer that their children be taught in English rather than indigenous languages (Roy-Campbell, 2019). These parents prefer English because they feel it is the language of power and is necessary for economic emancipation. Additionally, they see English as more than a language; they view it as a resource that may help their children achieve greater chances, since being proficient in English is viewed as a sign of superiority (Oyoo, 2017). English proficiency is highly prized by black African parents, who see it as a prerequisite for success in the corporate sector (Roy-Campbell, 2019).

The use of English and Afrikaans as only medium of instructions in South African schools paved a way for practices such as Bilingualism which is commonly defined as the ability to communicate using more than one language (Butler, 2012), one being an indigenous language. This practice is adopted in South African classrooms as it is believed by Cummins (2008) that mastery of the first language, which is an African language, may be utilised or transferred to mastery or learning of the second language, which is English. Further to that in the study conducted Bialystok, Craik and Luk (2012) revealed that bilinguals outperform monolinguals (learners who are proficient in only one language). Yet bilingualism has not as yet solved the problems of not using indigenous African languages as a medium of teaching and learning.

The benefits of using indigenous languages in schools has also made its way to South Africa. As the Department of Basic Education (DBE) is moving towards changing the status quo in education system by introducing indigenous languages in schools. This enormous transition is not only a pertinent issue for the DBE, but it cuts across all fraternities. In his address on the 24th of September 2019 (Heritage Day) President Cyril Ramaphosa urged South Africans to embrace their indigenous languages and further encouraged the nation to learn their indigenous languages in order to understand their identities. He also noted that by the end of year 2020 the DBE is aiming at ensuring that all 23000 South African public schools offer African languages where African learners can learn their languages (Zulu, 2019).

When delivering a speech at an event to celebrate indigenous languages at the University of Johannesburg's Soweto Campus on the 22<sup>nd</sup> of February 2019, the Honourable Chief Justice of the Constitutional Court of South Africa, Mogoeng Mogoeng, said the government should encourage people to study and make use of indigenous languages. He further encouraged South Africans to prioritise their mother-tongues to ensure that they do not lose their identity. Dr Somadoda Fikeni, who is a notable political commentator, also agreed with the Chief Justice as he asserted that when you lose your language, you lose your soul, you lose your history. The Honourable Minister of Sports, Arts and Culture, Mr Nathi Mthethwa, further agreed with Chief Justice Mogoeng and Dr Fikeni as he alluded that it is through the mastery of the mother language that the basic skills of reading, writing and numeracy are acquired (Sithole, 2020).

The South African Democratic Teachers' Union (SADTU) has also made a pledge to the DBE to consider teaching in indigenous languages as it will boost learners' performance in schools. While addressing the 2018 Education Indaba in Pretoria Mugwena Maluleka, argued that teachers need to be instructed to teach learners using their mother-tongue, as doing so will yield better teachers and results (Jordaan, 2018). Historian and Cultural Analyst Professor Pitika Ntuli in his interview on eNews Channel Africa (eNCA) on the 23rd of October 2019 on preservation of indigenous languages he indicated that in Africa where learners are taught in their languages their knowledge is

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phenomenal and further said being taught in an alien language is a barrier to education quality. Further to that traditionalist Zolani Mkiva, the general-secretary of the Congress of Traditional Leaders of South Africa (CONTRALESA), as he asserts that indigenous wisdom should be streamlined in the curriculum so that it may not be forgotten as decades pass (Ngobeni, 2020) Veronica McKay, Acting Vice-Principal of Teaching and Learning, Community Engagement, and Student Support (2020) at the University of South Africa (UNISA), agreed with Mkiva, implying that learning in one's mother tongue could help learners understand better and improve performance.

However, for DBE to attain its missions and vision provision of resources written in indigenous languages should be made available. The big question is, do we have resources written in indigenous languages? The answer is NO. Because out of 11 official languages in South African, only English and Afrikaans enjoys the status of being used as medium of instruction. Furthermore, these are the only two languages that has scientific language registers for Natural Sciences. The unavailability of these resources will make the DBE initiative remain a "paper policy". Hence this study is aimed at shifting a status quo by developing a scientific language register for Natural Sciences in one of the African indigenous languages which is isiNdebele. This register should serve as a resource which would advance the DBE initiative, reflecting on researchers such as Motloun et al. (2021); Oyoo and Nkopodi (2020) & Adesemowo (2017) on the benefits of using African indigenous languages as a medium of instructions. The focus of this paper will be on the challenges and opportunities in developing the scientific language register for Natural Sciences and stakeholder's perceptions on the use of isiNdebele as the language of teaching and learning Natural Sciences.

## Methods

### The Study Group

The research approach used in this study is a phenomenological and qualitative in nature. Creswell (2017) points out that a qualitative research design allows for the investigation of the phenomenon within its real-life context and in phenomenological research, no assumptions are made by researchers, but rather an effort is made to understand the experiences of the participants. Furthermore, a multiple case-study design was used because the researchers were more interested in obtaining in-depth details of what was being explored from more than one person (Nkanyani & Mudau, 2019). This design allowed the researchers to treat each case uniquely as participants had different background and teaching experiences.

Sampling is defined by Sahin-Topalcengiz and Yildirim (2020) as the drawing of a subset from the whole population for research purposes. This was a qualitative study; hence, purposive sampling was used to select participants for this study. As it was the best selection of information-rich cases for an in-depth study using participants who are knowledgeable about the phenomenon under investigation,

This selection ensured that only the most suitable participants participated in the study. This study targeted participants who were teaching Natural Sciences and competent in isiNdebele, as well as learners in the senior phase, as they were deemed by the researcher to be information-rich sources that provided useful insights in answering the research questions of this study. The parents of the learners were also part of the study. For the feasibility of this study, a purposive sampling of two Natural Sciences teachers in each of the two selected senior phase schools, two groups of learners from each selected school, and two parents from each selected school participated in this study. The researcher chose this number of participants to ensure that the collected data was manageable. Sampling was done based on the following criteria: Participants (teachers) taught Natural Sciences in senior phase schools, particularly in the Siyabuswa 2 circuit. Teachers, learners and parents were Ndebele speaking. Lastly, only participants who were willing to participate in the study were considered. Data was collected from Natural Sciences teachers, learners and parents using interviews.

### Data Collection Tools

Qualitative data collection in this study included two strategies. The first strategy consisted of one-on-one semi-structured interviews with a set of pre-determined questions (Creswell, 2017; Maree, 2017). Interviews were in two- phases. The first phase took place during the development of the scientific language register, wherein senior citizens, isiNdebele teachers and Curriculum Implementors were informally interviewed on IsiNdebele scientific terms the researcher had challenges in developing. In the second phase two Natural Science teachers, two groups of learners and two parents from selected schools were interviewed on their perceptions on the use of isiNdebele as the language of teaching Natural Sciences?

Even though interviews are considered to be time-wasting and costly Sahin-Topalcengiz and Yildirim (2020), this technique has been determined to be the most relevant one to collect data because of the small number of participants who will participate in the study and because of the personalised nature of the interview data. It is

through the interviews that sufficient and relevant information was gathered (Nkanyani & Mudau, 2019). Moreover, interviews provided a richer source of descriptive information than could not have been gathered in instruments such as questionnaires (Serrano, Ibarra & Valenzuela, 2020). Participants were interviewed during their free time and after school to find out about their perceptions on the use of isiNdebele as the language of teaching Natural Sciences. The interview responses were tape recorded to ensure that the researcher had correctly captured the participants' responses.

The second strategy is a diary which is defined by Maree (2017) as "natural" document, which is frequently used in qualitative research and contain personal understandings and meanings that are process orientated. The diary in this study was used as an open-ended data collection tool wherein the journey to developing the register was captured. Reflections made from consulting different people and all other information that shaped the development of the register were documented in this diary.

### **Data Analysis**

Content analysis was used to analyse data collected from interviews and diary for this study. Audio-taped interviews were analysed by listening to them several times and transcribed into a word document. After transcribing the data from interviews, the researcher listened to the audio again. This was done to ensure that the transcribed data corresponded to the participants' responses. The transcribed data from interviews were read, and the researcher highlighted significant statements that provided understanding of the participants to create themes and categories using research questions (Creswell, 2017). The following themes emerged from the collected data: Opportunities, Challenges and Perceptions.

### **Data Presentation and Discussion Challenges and Opportunities**

With isiNdebele being the indigenous language recognised as one of the official languages in South African schools in the year 1985, it has painted a blueprint on the steady development of this language. This language was introduced in schools even though they lacked the resources at that time. While developing the register the researcher consulted different people such as the chairperson of isiNdebele Pan South African Language Board (PANSLAB) to assist in developing scientific terms in isiNdebele. He made assertions on lack of isiNdebele scientific terms and said: "The biggest challenge with isiNdebele there is limited terminologies let alone the scientific terms and most of the isiNdebele terms are borrowed from Afrikaans we are still in the process of changing them" From his assertions, it paints a clear picture that isiNdebele is still way behind in terms of development, as alluded to by (Abongdia, 2013; Skhosana, 2002).

The chairperson also made another assertion as he mentioned one of the challenges they encounter when developing isiNdebele scientific terms that it is still difficult to develop scientific terms in isiNdebele because there are no one word terms. Hence, that means they must join two or more terms to come up with the equivalent word such as "weather" is derived from two terms which is "ubujamo" and "bezulu" = "Ubjamobezulu" which could be way too difficult to do due to non-existence of some terms in isiNdebele. Furthermore he noted that there is a Multilingual Natural Sciences & Terminology term list, written in English, Afrikaans, isiNdebele, isiZulu, isiXhosa and Siswati. However, most of isiNdebele terms in this list are borrowed from Afrikaans and some are directly translated from English and written in isiNdebele which attests to the assertions made by Skhosana (2002) and Mahlangu (2014) that isiNdebele has no scientific terms. They further alluded that the launching of isiNdebele bilingual dictionary in 2006 attest to the steadiness of the development of this language, as it was the last one to launch a dictionary compared to other indigenous languages.

### **Stakeholders Perceptions**

The South African School Act (SASA) (84 of 1996) stipulates that beyond the third grade, it is within the choice of parents and the school governing body (SGB) to choose the medium of instruction. However, this is still a paper policy in rural schools since learners are still subjected to learning all the subjects in English due to the lack of resources in indigenous languages (Abongdia, 2013). As the researcher was creating the isiNdebele scientific language register, she needed to know what stakeholders (teachers, learners, and parents) perceptions about using isiNdebele to teach natural sciences. The teacher from school A said: "I think it would be good... Most of the learners when you are explaining to them certain topics, they understand their language easier than English, moreover they would be free to ask questions as much as they wish. And they will better understand because now they would easily relate the content with their day-to-day activities, and they would answer the questions better since they will be learning in their home language". This teacher's perception was based on the fact that isiNdebele is their mother tongue which they understand best, hence learning using their mother tongue will limit the language

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barriers as they will be able to ask and answer the questions at ease. Furthermore, he noted that when learners learn using their mother tongue, they can easily relate the content to their day-to-day life experiences. This is further supported by researchers such as Adesemowo (2017) who made assertions that the benefits to using an indigenous language to teach African learners is that learners can relate to concepts in their own language and culture.

While English is considered a medium of instruction for African learners, it can be a barrier to effective teaching and learning, as van Pinxteren (2022) and Oyoo (2017) have noted. From the teacher's view, learners understand certain topics better when they are explained in their mother tongue. This attests to Adesemowo (2017), who made assertions that there are benefits to using indigenous language to teach African learners as they are able to understand better and relate to concepts in their own language and culture. This teacher's perception is further supported by parent's perception in school B who alluded that: "If they use isiNdebele, learners will perform better because it is the language that they are used to and it is their home language they are used to the language. They talk using this language at home and both at school. So, they will be excelling in their subjects and we will be able to assist them with their schoolwork". This perceptions is further supported by learners in school A as they alluded that: "If we could learn in isiNdebele it would be better and some of us could understand and perform more, because we have passion in learning but the challenge is the language which is English that is difficult for us to understand". "I think, it would be good. Because it would make us achieve more because we will be using own language and which of course we will be able to understand whatever question that is asked in the exams or tests and answer without any difficulty"

These stakeholders supports and believe that the use of indigenous language as a medium of instruction could bear much success as these learners will be learning in the language which they understand better and they could perform better, as alluded to by researchers such as (Adesemowo, 2017). These stakeholders shared the same sentiment with political commentators such as Dr Somadoda Fikeni, traditionalists such as Zolani Mkiva, and Historian and Cultural Analyst Professor Pitika Ntuli, who affirms that learning in the mother tongue improves a learner's performance. Traditionalist Zolani Mkiva, the general secretary of the Congress of Traditional Leaders of South Africa (CONTRALESA), is also in support of the use of indigenous languages as a medium of instruction.

According to McKinney and Tyler (2019); Nomlomo (2017); Milligan and Tikly (2016) & Heugh (2013), the transition from learning all content subjects in the mother tongue from grades 1-3 to learning all content subjects in English from grades 4-12 has a greater negative impact on African learners' performance. Regardless of the impact, some stakeholders still promote the use of English as a medium of instruction in schools. As the teacher from school B said: "Preferably, I prefer English because I think, number 1 it is because of the terminology that is used in Natural Sciences, it is not English per se, but it is Science. Then it is better off taught to them in English so that they can also be able to interpret whatever it is that the textbooks are saying to them so that it is not a strange thing that they are starting to see Natural Sciences in English. More-over in Natural Sciences, my learners are expected to talk, or rather to speak English. And then because of that, language that is used during Natural Sciences, it is not easy for them to just go out of control in a class. And make disrupt the classroom and so they prefer to remain quiet. Instead of them saying something that is grammatically wrong".

This teacher's perception was further supported by parent from school A he said: "I personally perceive that using isiNdebele will disadvantage our learners. One, there may be concepts that are not yet known to them. Remember when we talk teaching, we are integrating the prior knowledge with the new knowledge. Now, learners will be disadvantaged by the fact that their prior knowledge does not know the concepts that they will be bringing into class". Some leaners from school B shared the sentiments and they do not approve the use of isiNdebele to teach natural sciences as they indicated that: "I do not think it will be good because most of the learners their parents want them to speak and get used to English, it would be difficult for them to understand natural sciences in isiNdebele and that will affect their performance". "It will not be good ma'am because transferring science concepts to isiNdebele It will be way difficult for me, since I am not fluent in isiNdebele because, I prefer English" These stakeholders do not promote the use of indigenous languages to teach natural sciences because English has an advanced vocabulary and that there are limited resources in indigenous languages, which is true. However, I do not see that as a reason enough to deprive African learners the privilege of learning in their mother tongue just like their counterparts, as resources could be developed with time. Further to that their perceptions are influenced by the status engendered by English (Roy-Campbell, 2019; Tembe & Norton 2011). This confirms Oyoo and Nkopodis' (2020); Tshotsho's (2013) & Heugh's (2008) assertions on how African teachers, learners and parents devalue indigenous languages while placing a value on English and Afrikaans.

### Findings

The findings of this study reveal that IsiNdebele is still a developing language as there are still limited scientific terms in IsiNdebele. Furthermore, the existing scientific terms in isiNdebele are mostly borrowed terms

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from Afrikaans and English, and some are directly translated from English and Afrikaans. The gradual development of this language is, however, promising, such as having a bible written in isiNdebele and having terms in the Multilingual Natural Sciences & Terminology term list shows progress, though it is still minimal. The steady development of this language negatively influences some stakeholders' perceptions on the use of this language to teach Natural Sciences. As they totally discouraged due to that isiNdebele is still underdeveloped and has limited scientific terms. Hence, they prefer English as a medium of instructions because it has well developed vocabulary and English been perceived as enabling factor for international mobility, and a powerful tool for linguistic superiority and economic benefits (Roy-Campbell, 2019).

These stakeholder's perceptions attest to Bloch's (2009) assertions that Africans depress the use of indigenous languages, uplifting the dominant language at the expense of indigenous languages. This practise is further referred to by Tshotsho (2013) as "self-hate". Chief Justice Mogoeng Mogoeng criticise this practise, stating that the concept that English would help one advance in the corporate world is incorrect, since the Chinese, Koreans, and many others are surviving and performing significantly better in science and technology than those that use a foreign language as a medium of instruction. It is a fact that isiNdebele is still underdeveloped however, that is not a detrimental factor to it being a medium of instruction as language is not stagnant, hence isiNdebele can be developed with time and adequate resources until it enjoys a status of not only being considered as an official language but as a medium of instruction as well. Just like Afrikaans which was developed by borrowing words from Dutch (Uys, 1983).

Some learners noted that they prefer English because their parents wanted them to be fluent in English. Some learners noted that they are not fluent in isiNdebele hence learning Natural Sciences in this language will pose a huge challenge to them as they will find difficulty in transferring science concepts to isiNdebele. They also highlighted that they do not understand English but still prefer it because it is their parents' preferred medium of instruction. Teacher from school B also highlighted that when using English as the medium of instructions learners do not get disruptive in the classroom hence, they remain reversed as they fear making grammatical errors. This shows how much of a struggle and oppressing the use of medium of instruction poses to African child. His assertion also reveals that English is not only a barrier to effective teaching and learning but it can also be used as a form of discipline to African child. This shows the amount of what Malekela (2003) refers to as "torture" endured by African learners when learning English as a using medium of instruction.

Contrary, some stakeholders had positive perceptions of the use of isiNdebele to teach Natural Sciences because isiNdebele is the learner's home language, which they understand better and are fluent in. As a result, learning in it will reduce the language barriers and challenges that these learners face when they are taught in English, which is foreign to them. Furthermore, some learners saw this initiative as a great opportunity for them to excel in Natural Sciences because they would be using a language, they are familiar with. Some parents embraced the use of isiNdebele as the language of teaching and learning Natural Sciences. Their perceptions were because learners would be using their mother tongue, which they understand best. Hence, this initiative will give them a better chance to be actively involved in their kids' schoolwork, which will also improve their performance in the subject.

### Conclusion and Recommendations

From the findings of this study, it is of no doubt that isiNdebele still lack scientific terms because this language is still underdeveloped. However, that does not overrule its chances of being developed to have such terms as language is not stagnant. Thus far this language has a bilingual dictionary, and it has terms listed in the Multilingual Natural Sciences & Terminology term list although most of them are directly translated from English and Afrikaans. This shows that there is progress in this language though it is minimal. With adequate investment of time and resources the development of this language can be plausible. Furthermore, some stakeholders believe that using scientific language register written in isiNdebele to teach natural sciences will give learners an opportunity to perform well in this subject as they will be learning in their mother which they understand best. It is therefore, recommended that isiNdebele be developed to such a state that it does not only enjoy the status of being recognised as an official language but also as a medium of instruction. As this has appeared to be negatively influencing some stakeholder's perceptions on the use of this language to teach Natural Sciences. Further to that more scientific language registers should be developed in African indigenous languages. This therefore poses a hurdle for linguists and scientists in terms of the work that needs to be done to develop such terms so that IsiNdebele<sup>1</sup> may enjoy the same status as English and Afrikaans.

<sup>1</sup> IsiNdebele- One of South African official languages

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## **Experiences on The Development of An Indigenous African Language Scientific Register for Natural Sciences: A focus on challenges, opportunities, and perceptions**

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