

MULTILINGUAL LEARNERS' PERCEPTIONS OF THE ROLE OF ENGLISH AND SCIENTIFIC LANGUAGE ON NATURAL SCIENCES LEARNING

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Abstract

South Africa has eleven official languages, and yet only two languages, English and Afrikaans are the Languages of Learning and Teaching (LoLT) in schools. Language is important in shaping the learning and teaching environment in a classroom. Teaching Natural Sciences in English in a multilingual classroom can be challenging when learners are not proficient in the language of LoLT. That complexity is exacerbated by the nature of scientific language which is designed and considered to be academic concise, precise, and authoritative, making scientific concepts inaccessible to most learners. This is an unfortunate situation because in science classrooms, learners are expected to read, comprehend, write, articulate, and use English and subject-specific terminologies. The authors of the current paper argue that both English language and scientific language create a learning barrier for the learners whose home languages are different from English, the LoLT. It is against this background that the current study being reported herein sought to determine multilingual learners' perceptions of the role of English language and scientific language in their learning of Natural Sciences. In a qualitative research design two grade 8 and 9 Natural Sciences classes and their teachers were selected from two high schools in township areas using purposive sampling technique. Data collection involved focus group interviews with learners and individual interviews with the teachers. Each teacher was observed once whilst teaching Natural Sciences to grade 8 or grade 9 classes. The qualitative data collected was subjected to content analysis and two main themes were obtained: 1. Learners' perceptions that English language and scientific language limit their understanding of scientific concepts; and 2. Teachers' assistance in mitigating challenges imposed by English language and scientific language experienced by English-second-language speakers. Learners from the two schools indicated that both English language which is their second or third language and scientific language imposed many challenges in their learning of Natural Sciences. These challenges included failure to read, write and understand Natural Sciences content. Those learners showed excitement at the prospect of learning science in their home languages as they were not comfortable with being taught in English. Teachers used code switching and hands on activities to mitigate language challenges in their classrooms. The study findings thus have implications for both curriculum policy implementation and continued teacher professional development.

Keywords: *Language of learning and teaching, Natural Sciences, scientific language, perceptions.*

1. Introduction

South Africa has a rich linguistic diversity considering that it has 11 official languages. This linguistic diversity co-exists in the science classroom alongside the subject-specific language of science which learners are expected to use and understand. According to a study by Stott and Beelders (2019), the majority of grade 8 and 9 learners in science and technology need assistance in developing reading and comprehension skills in English. Learners, especially in grades 8 and 9, perform poorly in Natural Sciences. These results might be linked to the perspectives of multilingual learners being taught science in English.

There is a realisation by teachers and researchers that most learners in South African township school classrooms are multilingual. They mostly speak African languages and English is usually not their strongest language. When they enter the science classroom, the content is delivered in English. The terminology and concepts in science can be difficult to conceptualise and science can essentially be considered as a language on its own (Motlounge, Mavuru, & McNaught, 2021). Learners often utter statements such as 'English is not my mother tongue' and malapropism in their written work is noteworthy.

According to Yore and Treagust (2006), both teachers and learners' utterances in the classroom are critical for effective teaching and learning. To achieve understanding, the utterances must be made on

shared ground and in a common language (Yore & Treagust, 2006). In a way the use of English as a LoLT, marginalises some English second language speaking learners (Motlounq et al., 2021). The authors of the current paper argue that both English language and scientific language create a learning barrier for the learners whose home languages are different from English, the LoLT. Consequently, the current study sought to determine multilingual learners' perceptions of the role of English language and scientific language in their learning of Natural Sciences. The following research questions guided this study: 1. How do grade 8 and 9 multilingual learners perceive the role that English language and scientific language play on their learning of Natural Sciences? 2. How do science teachers assist multilingual grade 8 and 9 learners in overcoming language challenges in the Natural Sciences classrooms?

2. Literature review

As found by Kurniawan et al. (2019), the learners' perceptions towards something significantly influence how they react to it. Learners perceive science to be extremely difficult and, as a result, perform poorly in the subject. Learners with this perception put forth less effort in science because they believe they will never improve, and when they receive poor results, they confirm that science is difficult (Kihwele, 2013). Such perceptions are worsened by the fact that the language of learning and teaching is different from the learners' home languages, especially learners from township schools.

Liu and Baird (2012) discovered that using a minority language and/or a lingua franca in the courtroom boosts confidence in the judicial institution. This could hold true in a classroom setting as well. Prah (2003) found that being taught in the mother tongue fosters a more creative and imaginative environment, thus learners in such an environment are generally more positive. On the same premise, it can be argued that when someone is negative towards the language of instruction, it may lead to a negative perception to anything that is taught in that language. Learners' perceptions are shaped by and large by society in which they live (Kihwele, 2013).

The study is guided by the sociocultural theory (Vygotsky, 1978). The sociocultural theory considers learning as a social practice that results from the interaction between the learner and the environment. In this case language is the medium of the learning and the interaction process wherein learners struggle to engage in a language different from their home languages. Language is also believed to be the primary means of mediation (Fahim & Haghani, 2012, p. 693).

3. Methodology

This study follows a qualitative research design (Creswell, 2014). In this approach, the strong contact that occurs between the researcher and the respondents makes it easier for the respondent to contribute to the shaping of research (Eyisi, 2016).

3.1. Selection of participants

Using purposive sampling technique (Patton, 2002), two grade 8 and 9 Natural Sciences classes and their teachers were selected from two high schools in township areas. All the selected teachers taught Natural Sciences in multilingual classrooms. In fact, English was not learners' home language and hence they only encountered the language during the teaching and learning process in the classrooms.

3.2. Data collection and analysis

Data collection was done in two phases involving two focus group interviews with learners and individual interviews with the teachers followed by lesson observations. Firstly, two focus group interviews were contacted with learners in each of the two schools to investigate how grade 8 and 9 multilingual learners perceive the role that English language and scientific language play on their learning of Natural Sciences. The second phase of data collection involved each teacher being interviewed and then observed once whilst teaching Natural Sciences to grade 8 or grade 9 classes. A total of four lesson observations and two individual interviews for the teachers were made as part of data collection. The purpose of the lesson observations was to determine how teachers assist multilingual grade 8 and 9 learners in overcoming language challenges in the Natural Sciences classrooms. Focus group interviews with learners, individual interviews with teachers, and the lesson observations were audio and video recorded with permission from the participants.

Before analysing the data collected, the researchers transcribed the interviews and the lesson observations. Data was then subjected to content analysis (Bowen, 2009) in a process which Marshall and Rossman (1990) referred to as the process of 'bringing order, structure, and meaning to the mass of collected qualitative data'.

4. Findings

Data analysis resulted in two themes: 1. Learners' perceptions that English language and scientific language limit their understanding of scientific concepts; and 2. Teachers' assistance in mitigating challenges imposed by English language and scientific language experienced by English-second-language speakers. The details are presented in the subheadings that follow.

4.1. Multilingual learners' perceptions of the role of English and scientific language in the Natural Sciences classrooms

The findings come from the two focus group interviews with learners held in the two selected schools. This was meant to answer the first question: How do grade 8 and 9 multilingual learners perceive the role that English language and scientific language play on their learning of Natural Sciences? Table 1 shows an example of an analysis made from focus group interviews.

Table 1. Example of the analysis of focus group interview data.

| Learners' responses | Categories | Sub themes |
|--|--|--|
| <ul style="list-style-type: none"> • English is difficult • This is not my home language • I dont even speak English with my friends outside the classroom • It is unfair to us • Why can't I learn in the language I understand | Nature of English language | English pauses challenges as a language of teaching and learning of science. |
| <ul style="list-style-type: none"> • Science is complex • Some of the topics do not make sense • Some words are not even in English hence are hard spellings are hard to remember | Nature of science language | Science has difficult words and expressions which make it difficult for learners to understand what they are taught. |
| <ul style="list-style-type: none"> • Science would be much easier • I think I would like to learn Natural Sciences every day. • I am sure I would pass Natural Sciences • In any case my teacher mostly explains in Sotho after we read the textbook | The use of home language in the classrooms | Learners showed a lot of interest on the prospect of learning science in their home language which is IsiXhosa. |

The findings from the focus group interviews show the learners' perceptions in relation to nature of English language, nature of science language, and the use of home language in the classrooms. The learners perceived English language as a difficult language which causes them to perform poorly in science. The learners viewed the use of English as a language of learning and teaching as an unfair practice considering that it is not their home language. The unfairness comes from the fact that these learners must compete with colleagues who are English first language speakers as they get to write the same assessment tasks. Such frustrations are encapsulated in statements such as: "This is not my home language" and "Why can't I learn in the language I understand." As such, learners perceived English as pausing challenges in the teaching and learning of Natural Sciences.

The findings also depict science as a complex subject due to the use of terminologies that the learners are not familiar with. The learners pointed out that science language makes science concepts less accessible and as such they struggle to understand some topics. The following statement depicts the level of the complexity: "Some words are not even in English hence the spellings are hard to remember." Learners indicated that this unfamiliar language makes it difficult for learners to understand what they are taught.

In their responses learners showed excitement with the prospect of learning and being taught science in their home languages. They indicated that science learning will be so much easier and understandable as they will not have to learn two subjects (both English and science) in the science classrooms. The learners felt that the use of home languages will create a level playing field where they have an equal opportunity just like their counterparts (English first language speakers) currently enjoying being taught in a language that they are familiar with. The learners pointed out that they are positive about this as they understand concepts when their teachers utilized their home languages to explain complex science concepts and processes in the classrooms. The following statement shows that the learners are

positive about the use of home languages: “I think I would like to learn Natural Sciences every day”. They believed that it would make the subject easier to understand and enable them to pass with good marks.

4.2. How teachers assist multilingual learners with language challenges in the Natural Sciences classrooms

This section presents findings that answer the research question: How do science teachers assist multilingual learners in overcoming language challenges in the science classroom? Two teachers from two different schools were interviewed and observed teaching. The purpose of teacher interviews was to establish the methods in which teachers assist multilingual learners and how the teachers deem these methods important or sufficient. The lesson observations were to corroborate whether the methods the teachers referred to during their interviews are in fact, put into practice during their lessons. Table 2 shows an example of the analysis of data to show teachers’ efforts.

Table 2. Analysis showing strategies teachers used to mitigate language challenges.

| Types of strategies teachers used | Nature of assistance | Categories |
|--|--|--|
| <ul style="list-style-type: none"> • Use of videos • Use of pictorial images and diagrams • Use practical investigations • Use of demonstrations • Use of simulations • Engaging learners in hands-on activities • Use of role play | Reduction of the use of words | Teachers implemented strategies that reduce the use of words to mitigate language challenges |
| <ul style="list-style-type: none"> • Learners writing scientific terms and seek translations in their homes languages • Code-switching between English and learners’ home languages | Use of home languages | The use of learners’ home languages created a classroom environment where learners managed to communicate and understand teacher explanations. |
| <ul style="list-style-type: none"> • Use of group work when doing activities or answering assessment tasks • Discussing meanings of terms in peer groups • Learners making presentations to practise communicating in both English and science languages. | Fostering partnerships in the classrooms | Teachers fostered partnerships in the science classrooms where learners helped each other to mitigate language challenges. |

From Table 2 teachers assisted learners to mitigate language challenges by: reducing the use of words; using home languages (code switching); and fostering partnerships in the classrooms. By using teaching strategies such as videos, simulations, illustrations and investigations, the teachers minimised the use of verbal communication which helped learners to understand concepts better. Excessive use of words in explanations would limit learner understanding since they lacked fluency and proficiency in the language of learning and teaching. It is evident that code-switching plays a pivotal role in breaking down scientific concepts to assist the learners’ understanding.

By fostering partnerships amongst learners in the science classrooms, the teachers created platforms where learners helped each other to mitigate language challenges. Teachers placed learners in groups so that they could work whilst assisting each other when doing activities or answering assessment tasks. Teachers also allowed learners to discuss the meanings of scientific terms in peer groups. Because most of the learners only got to communicate with each other in English during learners, teachers tasked them to do more by assigning them to make individual presentations in their groups and group presentations to the whole class.

5. Discussions and conclusions

The findings showed that multilingual grade 8 and 9 learners perceive both English as a language of learning and teaching and science language as difficult and complex hence impeding their success in science assessment tasks. As such, learners have negative perceptions about science which causes them to perform poorly. These findings are commensurate with findings of a study by Kurniawan et al. (2019), where learners’ perceptions towards something significantly influenced how they reacted to it. Learners showed excitement at the prospect of being taught science in their home languages, which Prah (2003)

pointed out as an important development since being taught in the mother tongue generally creates a more positive learning environment. Previous research also found that the use of English as a language of learning and teaching marginalises some English second language speaking learners (Motloun, Mavuru, & McNaught, 2021).

Findings from both learner focus group interviews and lesson observations showed that the use of code switching played an important role in mitigating language challenges. Teachers created classroom environments where the teaching and learning process took consideration of how science also contributes towards learners' lack of understanding of scientific concepts and processes. This is commensurate with the sociocultural theory (Vygotsky, 1978) which was used to as the lens to interpret the findings. The strategies used created interactive opportunities for the learners in the science classrooms which are key for meaningful learning (Vygotsky, 1978).

What stands out clearly from the findings is that learners appreciated the prospect of being taught in their home languages and that teachers could employ teaching approaches which embraced all learners in the science classrooms despite the challenges faced due to the lack of proficiency in the language of instruction. The findings of the study provide meaningful guidelines for teacher professional development programmes to create necessary opportunities for teachers to be equipped with skills to utilising strategies that help learners access and understand science concepts despite their poor proficiency in the language of learning and teaching.

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