LOCAL LANGUAGES AS MEDIUMS OF INSTRUCTION FOR SCIENCE TEACHING AND LEARNING: SECONDARY SCHOOL STUDENTS' PERCEPTIONS

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ABSTRACT

Schools in Zimbabwe use English as a medium of instruction in the teaching and learning of most subjects, save for indigenous languages. Linguists have, however, recommended the use of indigenous languages in education to ensure mastery of concepts. This current study sought to find out secondary school learners' perceptions on the teaching and learning of the sciences using a local language as a medium of instruction. Thirty six Science learners were purposively sampled from a high school in Masvingo District. Phillipson's Theory of Linguistic Imperialism was used as the major theory from which the learners' perceptions towards the use of local languages could be understood. Data were gathered through focus group discussions and lesson observations. The participants indicated that they understood concepts better when an indigenous language was used as a medium of instruction in teaching and learning Science subjects. Most learners, especially those in lower forms, reported that concepts are better understood in mother tongue. From the observations, the researchers noted that students engaged more in organised Science learning activities when an indigenous language was used. Participation was low when teachers consistently used the English language without code-switching to the local language. However, students still preferred being taught in English as Shona lacked sophistication and had limited science vocabulary. The study recommended the use of both English and Shona to increase the learners' proficiency in the Sciences. It was also recommended that linguists should be engaged to coin terms in local languages that can be used in the teaching and learning of the Sciences.

Keywords: STEM, indigenous languages, medium of instruction, learning, and Science learners.

BACKGROUND TO THE STUDY

Science, Technology, Engineering and Mathematics (STEM) are viewed as the key to Zimbabwe's economic turnaround endeavours (Sunday Mail, 1 May 2016). Considering the importance of these subjects in promoting innovation in the country the government of Zimbabwe embarked on a programme to motivate A-level students to consider Science subjects as subjects of choice. The Ministry of Higher and Tertiary Education offered free education to all students in public schools who registered for science subjects at Advanced Level beginning in 2016. The government went hook and sinker in paying A-Level science

students' tuition and boarding fees. It is apparent that the teaching of STEM was non-negotiable given its importance.

This programme was meant to increase quite significantly the number of Science students at A-Level and also science related degree programs at Tertiary level. There were challenges, however, schools had to grapple with, which could militate against passes at A-LEVEL. Most schools lacked appropriate facilities such as science laboratories, libraries and computer laboratories (Sunday Mail, 1 May,2016). Additionally, there was the unending debate on what language to use as medium of instruction. Researchers claim that language could be a barrier to meaningful classroom communication if it is inaccessible to learners (see for example Heugh, 2005; Phillipson, 1992).

With regards the language of teaching, the new curriculum encourages the dominant use of the English Language as the medium of instruction at secondary school level. Many researchers and linguists have advocated against the teaching of Science subjects in English (Nhongo, 2013). For example, Heugh (2005) reports that the use of English Language as medium of instruction in South Africa contributes a great deal to the high failure and dropout rates among black students. The current call for the enrolment of as many STEM students as possible is, however, silent on the language variable which according to many linguists has a great contribution on mastery of concepts. Thus, the real benefits of STEM in Zimbabwe may not be fully realised if the content is still taught through the English medium. Researchers may indicate many benefits of teaching through the indigenous languages but do learners perceive it that way? Hence this study sought to find out the learners' perceptions towards learning Science subjects using indigenous languages.

RESEARCH QUESTION

What are the learners' perceptions on the use of an indigenous language as a medium of instruction in the teaching and learning of the sciences?

OBJECTIVES

The objectives of the study were threefold:

1. To find out whether student engagement increases when an indigenous language/local language medium of instruction is used in teaching and learning Science.

2. To find out whether learners understand Science content better when they are taught in a local language.

3. To determine the language of instruction preferred by students in learning science.

THEORETICAL FRAMEWORK

The research is tethered on Phillipson's Theory of Linguistic Imperialism (Phillipson, 1992) which is defined as a situation where one language (particularly English) holds a hegemonic position while the rest of the languages are made to play peripheral roles. In Africa, imperialism was the major contributory factor that led to the linguistic colonization of the African languages.

Scholars such as Prah (2009), and Mutasa (2006) are totally against the linguistic colonization of African languages. These and other scholars believe that the process of linguistic decolonization in Africa can only be achieved by ensuring that indigenous African languages come first in all significant discourses. In fact, Prah (2009) advocates the use of indigenous languages throughout the educational experience through to the tertiary level. He

argues that, "It is in these languages that the intelligence of Africans is most discerning and creative, these are the languages of mass society and hence its development" (ibid: 9). Prah is actually saying that Africans are intelligent but if they continue accepting the hegemony of English and never utilize their own languages their creativity and intelligence may never be realized. The use of these indigenous languages, according to Prah, will ensure Africa's development. This is because Prah (2009) believes that through the use of African languages in education, the transmission of Science and technology into the cultures of the African commonalities will be ensured.

The belief that English is indispensable in the global economy has been vigorously refuted by Phillipson (2015:9) who argues that:

> While English is of major importance for the global economy, assuming that it is so 'basic' that it is a requirement for economic success is contradicted by the fact that the economies of China, Japan and Korea succeeded through using local languages in education, as do continental European countries.

Phillipson further argues that we cannot willingly accept the use of English in education thinking that it is indispensable. China, Japan and Korea, among other countries, have successfully used their indigenous languages and this has seen a phenomenal growth of their economies. The fact that people are thinking in their own languages is promoting creativity and innovativeness unlike a scenario where people are literally asked to 'dream' in a foreign language.

Phillipson (2015) argues that the belief that English is possessed by all who use it disregards the imbalances that are engendered by and through English. Linguistic Imperialism (as propounded by Phillipson) and Linguistic Hegemony (by Gramsci) have had a negative influence on the mentality of the majority of Africans. However, Phillipson (1997:246) insists that, "…we need a paradigm shift, a radical rethinking of language-in-education policies worldwide, and how educational 'aid' addresses them." This means that the way people perceive their own languages in relation to English should change. Prah (2009:10) argues that:

> We are not suggesting that English should not be taught in schools. We are saying that, as it is done in Germany, France, Sweden, Norway, Italy, the Netherlands, Japan, China, Vietnam, Indonesia, Thailand and many more, English should not supplant the role and position of the local languages. It should be taught as a subject, a contact language, as is done in all these countries and not allowed to replace the legitimate and rational functions of local languages.

Thus, Prah (2009) concurs with Phillipson (1992, 1997, and 2015) that Linguistic Imperialism should never be condoned and that local languages should take leading roles in education circles. There is need for the decolonization of the mind (Ngugi, 1981) so that people would begin to believe in their local languages and use them as languages of teaching and learning, thus ensuring the continued existence of these languages.

Indeed linguists advocate the teaching of Science through indigenous languages but do learners concur? This study sought to find out the learners' perceptions towards learning Science through an indigenous medium of instruction.

RESEARCH DESIGN

The qualitative approach was used in carrying out the study. The qualitative approach is a process that takes place in a natural setting or environment in which the researcher can be a passive or active participant in the conducting of the research (Creswell, 2002). A case study design was utilised to gather data for the study. The advantage of a case study design is that it allows the researcher to carry out an intensive study of an individual ,event, organisation or specific context (Trochim, Donelly and Arora, 2016). The research design was deemed appropriate as it enabled the researchers to get first-hand information by visiting the selected secondary school and observing the real situations so as to establish the perceptions of learners on the usefulness of Zimbabwean indigenous languages in learning Science subjects.

Sample

Purposive sampling was used to select a sample for the study. The researchers used the non-probability sampling technique because it enables the researcher to select specific elements or participants for inclusion in a study that have certain characteristics relevant for the study. With purposive sampling one is likely to reach the target sample quickly and also get their opinions (Kumar, 2011). The principle of selection in purposive sampling is the researcher's judgment as to typicality of interest (Robson, 1998). In this study purposive sampling was used to select participants doing sciences from Form one up to Advanced Level. One school from Masvingo urban was purposively selected. The selected school had Form 1 to 6 and one class per each form was for the sciences. From each class, six were purposively sampled. Using the teachers' Individual record books, two low; two average and two high flyers were selected per each class to participate in the study. This gave a total of thirty-six pupils doing the sciences who were selected to participate in the study.

Data Collection

The researchers collected data from the participants through observations and focus group discussions. Qualitative researchers contend that all researches about social phenomenon like education can be best carried out through the use of interactive techniques of generating data. (Leedy and Ormrod, 2005). One such technique is observation. The research, being largely qualitative in nature, was field focused. This implies that a researcher in education cannot avoid visiting schools and observe what goes on in those schools. In this research the researchers observed students learning the various STEM subjects.

The main advantage of observation as a data gathering instrument is that it enables the researcher to get first-hand information by observing situations as they occur. Corbin and Strauss (2008) argue that the reason why observation is so important is that it is not unusual for persons to say they are doing one thing but in reality they are doing something else and the only way to be sure is through observation.

 In this study the researchers used an observation schedule to determine whether indigenous languages were used in teaching and learning Science. The researchers consistently used the observation schedule to collect data, upon which items on the observation schedule were completed. A total of 6 lesson observations were done to establish whether or not the language variable contributed to the mastery of STEM subjects secondary school level. Thus, information about the physical environment and about human behaviour was recorded directly by the researchers without having to rely on retrospective or anticipatory accounts of others (Sapsford and Jupp, 2006).

Another data gathering tool used in this study was the focus group interview. De Vos et al. (2005) describe a focus group interview as a way of obtaining a better understanding of how

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24
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people feel or think about an issue, product or service. Focus group interviews are an interaction within the group where members discuss a topic supplied by the researcher (Morgan, 1988 in Cohen, Manion and Morrison, 2007) yielding a collective rather than an individual view.

 The major reason why the focus group interview was chosen is that it presents a more natural environment than that of an individual interview because participants are influencing and influenced by others-just as they are in real life (Krueger and Casey, 2009). Therefore, through interaction among group members, participant views emerged giving the researchers insights that might not have been available in a one on one interview.

Ritchie and Lewis (2003) point out that in focus group interviews data are generated by interaction between group participants. They further state that participants ask each other questions, seek clarification, comment on what they have heard and prompt others to reveal more. In addition, in responding to each other, participants reveal more of their own frame of reference on the subject of study (Ritchie and Lewis, 2003). This implies that participants should be allowed to interact amongst themselves on issues raised by their colleagues as a way of unearthing in depth knowledge on issues that relate to the research sub questions. As the discussion progresses, an individual response becomes sharpened and refined and moves to a deeper and more considered level (Ritchie and Lewis, 2003). In this study, the six focus group interviews helped the researchers to reach a deeper understanding of the learners' perceptions on the usability of indigenous languages in the teaching and learning of the STEM subjects since most of the discussions raised a lot of debate on the issue under investigation.

A thematic analysis of focus group interviews and observational data was made to determine learners' perceptions in determining appropriate language of instruction in STEM.

RESULTS, ANALYSIS AND DISCUSSION

Data were collected from the participants through class observations and student focus group discussions. The following themes emerged and they are discussed in detail in the ensuing discussion.

Medium of instruction

The six lesson observations and the focus group discussions revealed that the school was bilingual. The two languages used in the teaching and learning of Science were English and Shona. Shona is one of the indigenous languages in Zimbabwe or L1 while English is a second language or L2. Students in the focus groups indicated that teachers were code switching from English to Shona in their science teaching regardless of learners' educational level. Researchers noted excessive use of Shona in Science teaching and learning at junior secondary level (Form 1 and 2) while at O-Level Science teachers code switched to Shona only when students failed comprehend a scientific term. Teachers mainly used English language in teaching and learners interacted extensively in Shona. It would seem these Science teachers only used the local language when it was deemed necessary to do so. The local language should not be for convenience but should be, according to Ngugi (1981), the language of teaching and learning. English should not replace the legitimate function of local languages. In fact local languages should take a leading role in education rather than English. The extensive use of Shona by learners in their interactions suggest that it is the language that they understand better hence the need to use it to explain science concepts.

Language that enhances understanding

Responding to the question: 'What medium of instruction enhances understanding of science?, the junior focus groups stated Shona (local language) as the language that enables them to understand science better. The two focus groups argued that even if a question is in English they translate into Shona before answering. The   O-level focus groups also concurred that if Shona was used to clarify certain concepts their grades could probably improve significantly. These findings confirm Prah's (2009:9) observation that, "It is in these languages that the intelligence of Africans is most discerning and creative, these are the languages of mass society and hence its development." The continuous use of English is actually a hindrance to the mastery of science concepts at both ZJC and Ordinary Levels.

However, the A-level focus group differed in their perception concerning the use of Shona. The majority of students in the A-Level were sceptical that Shona could lead to deeper understanding of Science. A-Level focus groups seem to disregard the simple fact that in order to attain scientific proficiency higher level proficiency is need. Presumably the mother language provides that required proficiency.

 However, the researchers observed that using one local language other than English in a multilingual society has some shortcomings. Not every student may be proficient in the dominant local language. For instance, in these focus groups there were two Ndebele (in the Form 1 and Form 3 FGDs), one Nyanja (in the Form 2 FGD), one Mozambican (in the Form 4 FGD), and one Venda student (in the Form 6 FGD). Only two Non-Shona students indicated that they were proficient in Shona. It is apparent that other three non-Shona speakers would not benefit from being taught in a local language that they are not proficient in

Learner Engagement

Most of the focus groups concurred that the local language enhanced learner engagement. In the discussions, learners indicated that teacher-student and student-student interactions are increased as there would be no communication barrier (language barrier) as what happens when Science instruction is in English, a second language. Indeed, by using the local language, learners are more likely to engage in the learning process as they can express their ideas eloquently, without fear of making grammatical errors. This is what the researchers observed during lesson observation. It is quite common for people to regard someone who is not endowed with English as ignorant. Probably this plunges students into anxiety.

The Science lessons observed by the researchers at the school, particularly at Junior Secondary level, revealed that there was a considerable number of pupils who did not participate in the organised learning activities unless the teacher code-switched to L1. At Ordinary level few students interacted very well in English while the majority mixed Shona and English. The A-level interacted mainly in English. It can be inferred, from these results, that as long as Science learning is through the English medium of instruction, a few learners would access high quality education. The findings seem to be pointing to the fact that only those that are proficient in the English Language will ultimately pass the sciences, hence the reduced number of those that take it up to the Advanced Level. In order to engage productively in Science, students should understand how to participate in scientific debates, adopt a critical stance and to be willing to ask questions. They can only do so when they are proficient in the language that is used as a medium of instruction.

Increased performance

On whether the use of local language would increase performance or pass rate, the junior and O-level focus group members responded in the affirmative. A few O-Level and A-Level focus group members opined that performance was susceptible to many factors such as availability of resources, reading materials teaching pedagogy and individual IQ, psycho-social support, lack of content on the part of educators, lack of commitment by both educators and learners. Indeed poor performance is born out of a myriad of factors but the language variable is one of the key factors that affect learner performance.

Learner Language Preferences

Asked whether learners would prefer having the Sciences exclusively taught in a local language, all the focus groups indicated that Science instruction should be in English. The Ordinary Level focus groups indicated that if a local language was to be incorporated, this was supposed to be only in situations where a total communication breakdown would have been experienced when giving instruction in English.

Some of the reasons stated by students for rejecting the local language in preference of English included lack of sophistication in indigenous languages, limitations in Science vocabulary and employability of graduates taught through local languages in the global village. In a focus group discussion one A-LEVEL student argued that there are some scientific terms that do not have equivalents in the local languages and this limitation means they cannot be used as medium of instruction in teaching and learning science. To quote him verbatim, "What would you call aldehydes or ketones in local languages?" This is an indication that, generally, students do not appreciate local languages as potential mediums of instruction. This confirms that linguistic imperialism (as propounded by Phillipson) still reigns supreme in the mentality of these students because they believe that it is only English that can be meaningfully used to transmit educational knowledge. That is why Ngugi (1981) calls for the decolonisation of the African mind so that the negative perceptions by Africans on local languages can be changed.

 Interestingly, in the observation, the researchers noted that in all the lessons observed, teachers code-switched to Shona (the dominant local language spoken at the school) when explaining concepts, giving examples and even reinforcing points previously stated in English. This argument on limitations of local language with regards to scientific terms is quite porous given that there is no language that is self-sufficient in words. The English Language that the students preferred borrows words from other languages such as French, Greek, Latin among others. The local languages can do the same. If languages are negotiated constructions likewise scientific terms could be indigenised for instance thermodynamics could be 'temodinamikisi.'

CONCLUSION AND RECOMMENDATIONS

From results of this case study it can be concluded that, the students know that local languages if used as mediums of instruction facilitate scientific proficiency but claim that they lack sophistication and sufficient vocabulary to cover all scientific terms. The study also showed that the local languages are used by teachers at the school in the form of code-switching and this has facilitated mastery of concepts in the Science subjects by the students who lack proficiency in the English Language. The research, therefore, concludes that the school can use indigenous local languages to teach STEM concepts. The researchers, therefore, recommend that the school should use both English and Shona for higher level of

scientific proficiency to be attained. There should be a change of attitudes towards local languages and government should begin to show its support for indigenous languages in general and their use in STEM in particular. Further, the researchers recommend that linguists should be engaged to indigenise Science concepts for use by Science teachers.

REFERENCES

[1]   Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education (6ᵗʰ Ed.).* London: Routledge.

[2]   Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory (3ʳᵈ Ed.).* New Delhi: Sage Publications.

[3]   Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches (2ⁿᵈ Ed.).* Thousand Oaks, CA: SAGE.

[4]   De Vos, A. S., Strydom, H., Fouche, C. B., & Delport, C. S. L. (2002). *Research at grass roots: For the social sciences and human service professions (2ⁿᵈ Ed.).* Pretoria: Van Schaik Publishers.

[5]   Heugh, K. (2005). *Mother tongue based bilingual education in Southern Africa*. Cape Town: Volkswagen.

[6]   Kumar, R. (2011). *Research methodology: A step-by-step guide for beginners (3ʳᵈ Ed.).* London: SAGE.

[7]   Leedy, P. D., & Ormrod, J. E. (2005). *Practical research: Planning and design (8th Ed.).* New Jersey: Pearson Prentice Hall.

[8]   Mutasa, D. E. (2015). Language policy implementation in South African universities vis-à-vis the speakers of indigenous *African languages' perception*. *Per Linguam*, *31* (1), 46-59.

[9]   Ngugi, W. A. T. (1981). *Decolonising the mind: The politics of language in African literature.* Harare: Zimbabwe Publishing House.

[10]   Nhongo, R. (2013). A national language policy for Zimbabwe in the Twenty-First Century: Myth or reality*? Journal of Language Teaching and Research*, *4* (6), 1208-1215.

[11]   Phillipson, R. (1992). *Linguistic imperialism.* Oxford: Oxford University Press.

[12]   Phillipson, R. (1997). Realities and myths of linguistic imperialism. *Journal of Multilingual and Multicultural Development, 18* (3), 238-247.

[13]   Prah, K. K. (2009). *The burden of English in Africa: From colonialism to neo-colonialism.* Botswana: University of Botswana.

[14]   Ritchie, J., & Lewis, J. (2003). *Qualitative research. A guide for Social Science students and researchers.* London: SAGE Publications.

[15]   Robson, C. (1998). *Real world research are source for social scientists and practitioner researchers*. Oxford: Blackwell Publishers.

[16]   Sapsford, R., & Jupp, V. (2006). *Data collection and analysis*. London: SAGE Publications.

[17]   Trochim, W. M., Donelly, J. P., & Arora, K. (2016). *Research methods: The essential knowledge base*. New Delhi: Cengage Learning.