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Challenges Encountered in the Teaching and Learning of the Natural Sciences in Rural Schools in South Africa*

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KEYWORDS Natural Sciences. Teaching. Challenges. Resources. Junior Secondary Schools. South Africa

ABSTRACT The study sought to establish challenges encountered by teachers in teaching science in rural junior secondary schools in the Eastern Cape Province of South Africa. Located in the interpretivist paradigm and following a qualitative approach, the study adopted a case study design. A purposive sample of three school principals, three Natural Sciences teachers and eighteen Natural Sciences learners participated in the study. Data were collected through individual interviews with principals and teachers, focus group interviews with learners and lesson observation. Data were analysed for content. The study found that there were numerous challenges related to lack of required infrastructure and resources for science teaching. There were also challenges related to learners' background, language of instruction and lack of parental support. The study concludes that the teaching and learning of Natural Sciences in rural junior secondary schools is negatively affected by the existence of challenges which should be addressed. It is only after such challenges are addressed that Natural Science can be meaningfully taught and learnt in schools.

INTRODUCTION

There are many challenges faced in the teaching and learning of science subjects in schools. Kola (2013) states that science teachers are important in the teaching and learning of science and there is no development of science education in any country without considering teachers' contribution. There is a shortage of qualified science teachers in some African countries and in some instances teachers available to teach science may not be qualified to teach the subject (Muwanga-Zake 2001). If teachers have problems in understanding some of the topics in the subjects that they teach, it raises concerns around their content knowledge (Ramnarain and Fortus 2013). Kola (2013) as well as Ogunniyi and Rollnick (2015) note the problem of the existence of unqualified science teachers in schools in Africa and how this negatively affects quality science teaching and learning. The present study sought to establish challenges affecting Natural Sciences teaching and learning, some which could be teacher related.

Another challenge, there is a lot that has been said about STEM (Science, Technology, Engineering and Maths) skills According to Thornburg (2009), much of the work in Science, Technology, Engineering and Maths (STEM) treats them as separate subjects that are independent from each other, not as topics. There is a need to provide learners with the chance to learn to integrate different subjects in order to gain requisite skills for the workplace. As further noted by Thornburg (2009) maths, science and technology may be taught as separate subjects in school but it is important to ensure integration in their teaching as this enhances learners' understanding of each one of them. Such an approach of integrating the subjects is necessary because technology and engineering are related in the world of work and hence cannot be treated as separate subjects in the high school curriculum (Thornburg 2009). When students see (and understand) the interconnectedness of these four fields, they may find themselves more motivated to explore the individual subjects in detail. Hence the study sought to suggest how the implementation of NS curriculum could be enhanced to promote scientific literacy in learners.

Availability of Specialist Science Teachers

It is important to have specialist science teachers to ensure effective science teaching in schools. Science Community Representing Education (SCORE) (2011) uses 'specialism' to refer to the subject knowledge gained by a teacher through their academic and professional qualifications and experience and recommends the use of teachers who are subject specialists. Dudu (2013) and Makgato and Mji (2006) show concern on the problem of lack of qualified science teachers in South African schools. There are a number of studies which reveal the existence of weak teacher content knowledge (Stols

et al. 2007; Taylor and Moyana 2005). The issue of teachers' content knowledge should be addressed in order to ensure quality teaching and learning of science in schools.

Resources in Science Teaching and Learning

Idiaghe (2004) notes that availability of resources and academic productivity in learners are closely related. From research, Idiaghe (2004) established that learners in schools with inadequate teaching and learning facilities performed lower compared to their counterparts in schools with adequate facilities. It was the purpose of the present study to establish how teaching and learning of Science was conducted in generally deprived rural schools. Science, as a subject, requires adequate resources and facilities to ensure effective teaching and learning.

Appropriate resources in science teaching are pivotal as, according to Mudulia (2012: 531) "all scientific truths must be discovered through observation and experiment, not telling…." Laboratories, where experiments are conducted, should be available in schools to ensure effective teaching and learning of science. The necessary apparatus should also be available as well as other materials required to carry out the experiments. Mudulia (2012) further notes that for effective science teaching, textbooks, revision books, laboratory chemicals and equipment should be readily available.

Resources needed for teaching Natural Sciences in South African junior secondary schools are provided for each topic in order to assist teachers with planning and preparations. The list is only a guide and some of the suggested resources may not be readily available hence teachers should be innovative and suitable alternative tools and materials may be used (Department of Basic Education 2012). The policy document states that every learner must have his/her own text book but schools in some deprived rural environments may experience shortage or even non-availability of required textbooks. In instances where textbooks are available in a school, there should be a system in place for the allocation to and collection of such books from learners. It is also the responsibility of schools to ensure safe storage of books and other equipment (Department of Basic Education 2012).

The Department of Basic Education (2012) further notes that all science learners need to have sufficient spaces where they can carry out scientific investigations, using appropriate equipment. An important issue is on the safety of learners when they are using science equipment. It is, therefore, importance for teachers and learners to adhere to safety standards and learners should be made aware of safety rules (Department of Basic Education 2012). Emphasis should be placed on learners' actual carrying out of experiments for themselves. However, this is only possible in instances where the required resources are available or the learning of science becomes theoretical. Where possible, teachers are encouraged to improvise equipment to ensure that meaningful teaching and learning takes place.

Teachers should first determine learners' prior knowledge then introduce scientific concepts to help them construct new knowledge. Numerous ways could be utilised in introducing scientific concepts such as use of short lectures or presentations, watch videos or film, read passages from textbooks or reference books (Glenn 2001; Trowbridge et al. 2000). It is also important for teachers to focus learners' attention on the material to be learned is an important factor in effective learning and materials employed for teaching and learning should be consistent with individual learners' learning styles (Joyce et al. 2000).

According to Amos and Boohan (2002) audio-visual materials assist in bringing the real world to learners and these can be done by utilising the use of sound and video. Nayar and Pushpam (2000) observe that through the integration of appropriate media in the curriculum ensures learners' achievement of significantly higher learning outcomes. Use appropriate audio-visual materials in science teaching and learning assist even slow learners to understand scientific concepts (Nayar and Pushpam 2000). McSharry and Jones (2000) see the enactment of scientific processes as vital in ensuring active and experiential learning. This is in line with Vygotsky's social constructivist theory. In all instances, effective teaching and learning of science through the utilisation of appropriate approaches and techniques is only possible where resources are available.

The importance of laboratory, apparatus, electricity in teaching and learning of science cannot be overemphasised. Learners' involvement in practical activities in the laboratories assists them to better understand scientific processes. The issue of the importance of a laboratory in science teaching, therefore, cannot be

overemphasised. Quality teaching and learning of science is severely compromised in instances where there is no basic requisite infrastructure for science teaching and learning. In a laboratory and with the relevant material and equipment, learners are provided with the chance to actively learn science, which is by nature investigative (Tobin 1990). The importance of learners' active involvement in science learned is further emphasised by Osborne and Collins (2000) who argue that learners construct meaningful scientific knowledge and investigative processes by being actively involved in science knowledge construction. Similarly, Orji (2006) notes that the availability and proper use of relevant materials such library materials and science laboratory equipment has a positive influence on learner performance and ultimate attainment.

The use of Information and Communication Technology (ICT) includes computers, projectors, very important especially when the teacher is introducing new concepts and experiments that need visuals. However, not many teachers are conversant with using ICT which may present challenges. Dawe (2003) observes that the utilisation of new technologies enhances communication between teachers and learners greatly. The benefit of technology use may not be realised in conditions of lack and, as according to Dawe (2003) teachers may find themselves operating under very difficult conditions of lack. Furthermore, Bransford et al. (2000) note that use of ICTs in teaching and learning assists in improving the teaching and learning environment and contributes to learner achievement. Wong et al. (2006) shares similar views with Bransford et al. (2000) by pointing out that technology can play a part in supporting face to face teaching and learning in the classroom. When using DVDs in the classroom, for instance, showing learners the connection of electric circuits, then learners will watch and do hands on immediately and they grasp easily. Learners may understand concepts better and can practically demonstrate the skills without the help from the teacher. ICTs can, therefore, be utilised to ensure that science concepts are presented in a variety of ways which stimulate learners thinking and ensure understanding as well as completion of given tasks (Grabe and Grabe 2007). On the other hand, the internet could be utilised as a source of information in science teaching as internet provides learners with opportunities to search for information instead of being passive receivers of information (Pickersgill 2003).

Learners Background and Learning of Science

International benchmark tests indicate that South African learners did not perform well science when compared to their counterparts in other countries. Participation in the Trends in Mathematics and Science studies (TIMSS) in 2001 and 2003 has shown that South African learners have not performed well compared to learners in other countries, some of which are developing countries (Howie 2001, 2003). Such a view has serious implications on the teaching and learning of science in South African schools and the associated challenges. There are varied and complex reasons which could be attributed to poor performance of South African learners in the cited internal benchmark tests (Reddy 2004). Such reasons include poverty, resources, learning cultures, infra-structure of school and low teacher qualification. The poor infrastructure and limited resources can have a negative effect on science teaching and learning. That would inhibit the learners' interest in science.

Connected to learners' background and the teaching and learning of science is the issue of language. Science is taught in English and English is a foreign language to all the learners in rural schools. Research has shown that use of foreign language in teaching and learning results in numerous problems for learners. Tan and Tan (2008) state that learning in a second language is considered challenging when learners experience difficulties in deducing the meaning of Mathematics and Science language. Teaching science in a foreign language results in learners' problems of understanding concepts taught. Similarly, Ong and May (2004) observes that the problem is worsened if the science teachers are not proficient in English.

Teaching Science in English to second language English speaking learners negatively affects the learners' performance (Ferreira 2011). In a related study, Ferreira (2011) found that learners did not only experience challenges with English as a language but also with scientific language. Schaffer (2007) notes that science lessons taught in English are language lessons as they involve learning both science and the language. Rural learners learning science do not only grapple with science content but also with a language that is foreign to them. Mokiwa and Msila (2013) further note that language has a strong effect on educational quality and rural and historically black schools in South Africa

have the problem of the use of English as medium of instruction, which impacts on quality of education.

Underlining the significance of language in science teaching and learning, Taylor and Prinsloo (2005) also state that learners' lack of proficiency in the medium of instruction is the main contributor to poor learner performance at school. If the language used in teaching and learning of science is the language learners are not proficient in, then it becomes a hindrance in their understanding of science concepts and processes.

Over the last 15 years, poor performance in South African Education, particularly in science and mathematics has been documented in academic research (Christie et al. 2007). The findings of the third International Mathematics and Science study in 1998 and the Trends in Mathematics and Science study in 2003 revealed that, of the 50 participating countries, South Africa grade 8 learners were the lowest performers in almost all test items in Mathematics and Science, well below international benchmarks. In the TIMMS, grade 7/8 and grade 12 learners representing South Africa were deemed scientifically ignorant (Howie 2001). The majority of South African learners could not communicate their scientific conclusions, had problems in expressing their answers as well as understanding most of the questions. Howie (2001) argues that such problems could be attributed to English as the language of learning and teaching.

It has also been observed that pupils' skills in listening, speaking, reading and writing should be adequately developed in both their first language and in English (Alidou et al. 2006). Taylor and Vinjevod (1999) posit that the sound performance in school depends on basic literacy skills on which the majority of black South African children from disadvantage homes are severely handicapped. The authors observe that learners' level of language competence in schools is so poor that they are unable to read the learning materials provided for them, and the tasks and exercises they are given are often conceptually too difficult and beyond their competence. It has been observed that learners at primary school level may have interest in science but the interest decreases as they proceed to secondary and high school (Brigido et al. 2010; Murphy and Beggs 2013). It is, therefore, important for teachers to sustain learners in science. It has also been noted that secondary school learners may have positive attitudes towards nature sciences but negative ones towards physics and chemistry (Togrol 2013. There are also gendered views on learners' preference of science subjects, with boys said to prefer physics and chemistry whilst girls prefer life sciences (Scantlebury 2012). The reflection of women in science textbook and other materials could reflect gender bias leading to such gender stereotypes (Togrol 2013).

The use of language in science education is very important as it helps and supports learners learning in science. Learners from disadvantaged background they encounter challenges as they are used in learning with their mother tongue. Most teachers confirm that some learners have language problems, in the use of English as medium of instruction. Such challenges in thought processes and expression hinder their interaction with teachers and other learners (Reddy 2004). Similarly, Brock-Utne (2000) argues that learners' use of a foreign language as a medium of instruction negatively affects the effective teaching and learning of science in schools. This is despite the fact that science as a subject has its own discourse. Mclean (2000:125) also observes that many of the learners' learning difficulties in science emanate from insufficient knowledge of the basic vocabulary of the language of learning and teaching.

Teachers, should, therefore put in place strategies to assist learners to understand science vocabulary and also relate science concepts to learners' experiences.

RESEARCH METHODOLOGY

The study followed a qualitative case study design. Qualitative researchers believe that there are many dimensions underlying the phenomena so they look at the depth of the problem (Leedy and Ormrod 2013). The researchers employed a qualitative approach in order to seek understanding from those involved in the teaching and learning of Natural Sciences in rural junior secondary schools. The study engaged in an in-depth study of principals, teachers' and learners' views and experiences on teacher preparedness in the teaching and learning of Natural Sciences in rural junior secondary schools. A purposive sampling of three principals, three science teachers, and six learners in each of the three selected rural schools participated in the study. Data were collected through the use of

individual interviews with school principals and science teachers and focus group discussions with science learners. Content analysis was utilised to analyse data collected for the study. Audio-taped interviews were transcribed, the researchers then coded and categorised data to enable thematic analysis.

Ethical Considerations

The researchers attended to important ethical considerations such as informed consent, voluntary participation and withdrawal, confidentiality and anonymity as well as protection from harm. Participation of learners in the study was only done after their parents and guardians granted consent on their behalf since they were minors.

RESULTS

Participants were given codes and this was done to protect the identity of the participants. Participant codes are shown in Table 1.

Table 1: Codes for participants

Participant code	*Full description*
PSA	Principal School A
PSB	Principal School B
PSC	Principal School C
SEA	Science Educator A
SEB	Science Educator B
SEC	Science Educator C
SLA	Science Learner School A
SLB	Science Learner School B
SLC	Science Learner School C

Table 2: Participants' responses on challenges encountered in the teaching and learning of Natural Sciences

Sub-theme	*Issues raised*
Resources in NS Teaching and Learning	♦ Resources not available. ♦ No science kit. ♦ No laboratories in the schools. ♦ science textbooks are insufficient
Learners' Background and Science Learning	♦ Background affected on a large scope. ♦ Lack the background because of the environment. ♦ Some learners lived with illiterate parents/guardians. ♦ Poor background inhibits the learning of science.
English as Medium of Instruction/ The Language of Science	♦ Language is not easy for them to communicate. ♦ Introduction of MTBB made it easy for learners to understand science concepts. ♦ Learning negatively affected by the use of English ♦ Learners had problems in understanding some scientific terms and processes ♦ Educators often resorted to code switching. ♦ Learners' had problems in expressing themselves in English, often allowed to speak in mother language. ♦ There are difficult concepts that we do not understand they need to be explained in Xhosa.
Time Allocated to NS	♦ NS is so wide, time is a challenge. ♦ Work load, not able to finish at the expected time. ♦ Not adequate, there is more work and few hours. ♦ Not satisfied with the time allocation because there is a lot of work.
Support From Parents	♦ Parents could not assist their children financially and materially ♦ Parents/guardians could not assist their children academically. ♦ They help us in the activities that they understand.
Other Challenges in the Teaching and Learning of NS	♦ Absence of learners due to environmental factors. ♦ Negative attitude of learners· Overcrowded classes. ♦ Indiscipline of learners.
Measures to Address Challenges	♦ Ordered the resources since the DoE this year forwarded the catalogue to do so. ♦ DoE must build schools; there are not enough space due to the overcrowded classes. ♦ Trying to involve parents of the learners, community to help. ♦ Involve learners in sport activities. ♦ Using extra mural activities to help the learners

Challenges Encountered in the Teaching and Learning of Natural Sciences

This section presents information on participants' responses on challenges encountered in the teaching and learning on NS. Table 2 is a summary of the participants' views.

Resources in NS Teaching and Learning

On the issue of resources in the teaching and learning of NS, participants raised that lack of resources was a challenge that hindered the proper and meaningful teaching of the subject. Lack of proper infrastructure such as classrooms, laboratories and libraries negatively affected teaching and learning. PSA said, "*Resources are not available. We do not have a science laboratory in which to carry out the teaching and learning of science."* The issue of laboratories was raised educators who further stated that there was no enough classroom space as SEB said, "*We don't have a lab and our classrooms are too crowded with learners and this affects our teaching." Learners also confirmed infrastructural challenges as SLC said, "In this school we do not enough classrooms, we do not have a library and we do not have computers."* This lack of basic and required infrastructure showed serious challenges affecting the teaching and learning of NS in rural schools.

Participants also indicated the severe presence of material resources such as adequate NS textbooks, apparatus, chemicals and other equipment. PSB said, "*We do not have adequate materials such as apparatus and science kits. Children learn science without ever touching a microscope."* The same views were shared by educators as SEC said, "*The texts books that we have are very few and they are not in line with the new CAPS curriculum requirements."* SLA also raised the same point by saying that, "*We do not have good and enough text books."* Teaching and learning of NS becomes a real challenge in a situation where basic requirements such as textbooks, science apparatus and equipment are not available.

Learners' Background and Science Learning

On how learners' background affected their learning of science, participants in some ways found science concepts difficult due to lack of exposure. PSC said, "*That is a challenge due to the fact that we are in these Bundus (bushes), background negatively affects in a huge way. Most of the things taught at school are foreign to learners as they would have not seen or experienced them."* Educators also had similar views as SEA also said, "*It affects them in many ways, some live with grannies who are uneducated. Sometimes you teach something that is not in their community, they do not have any idea about, it gives a problem."* Learners also confirmed that some of the concepts learnt in NS were unfamiliar to them as SLA said, "*We are interested in things that are happening generally on earth but we experience challenges in science concepts we do not understand*." It was, therefore, clear from the participants' insights that learners encountered some challenges in understanding some NS concepts because of the rural and disadvantaged backgrounds.

English as Medium of Instruction/ The Language of Science

Participants also indicated that the use of English as a medium of instruction was a challenge in NS teaching and learning. Learners were English second language speakers who had problems in communicating in English and this was worsened by having to deal with a complex scientific language. PSB said, "*Learners find it difficult to speak and understand English because this school is in a remote rural area and English is never used in this area. Teachers have to resort to code switching when teaching."* The lead researcher experienced educators code-switching in all the observed lessons. In a lesson in school A the educator was explaining solution formation of solutions by mixing solutes and solvents and would code-switch in an attempt to make learners understand the concepts solute, solvent and solution. In asking questions, educators often translated questions into IsiXhosa and one of the educators encouraged learners to respond in their mother tongue as they were not comfortable responding in English. The researcher also observed learners speaking to one another in their mother tongue as they worked on group tasks given. Educators confirmed challenges in the use of English as a language of instruction and SEC had this to say, "*There are science terminologies that are very difficult for learners to understand and*

this becomes a source of learning barrier. The solution is to code switch." Learners also revealed that their desire to learn NS was negatively affected by their failure to understand some of the concepts as they were taught in English. SLC said, *"Yes use of English at times makes us fail to understand what will be taught but luckily our teacher always explains in Xhosa to make us understand."* Use of English as a language of instruction together with science terminologies were revealed to be real challenges affecting the teaching and learning of NS.

Time Allocated to NS Lessons

Regarding time allocated to NS lessons, participants revealed that the time was not enough to cover all aspects of the subject. PSB said, *"Time has always been a challenge; NS is so wide, there are many topics to be covered and a lot to do on each topic. Time is very limited, the teacher has to rush they cannot finish the things because of time constraints."* The educators also shared the same viewpoint as SEC said, *"No the time it is not adequate, there is more work in a term. The work is more and time is limited."* Similarly, the learners also felt time was not enough as *SLB said, "Time is not enough because sometimes we will be learning a difficult topic and the teacher does not spend much time on it because there are other topics to be covered."* Participants showed that inadequacy of time negatively affected the teaching and learning of NS.

Other Challenges in the Teaching and Learning of NS

Participants also raised some other challenges in the teaching and learning of NS such as learner absenteeism, learners' negative attitudes towards school and learner indiscipline. PSC said that, *"School attendance by most learners is very irregular and with frequent absenteeism some learners are always behind with their work."* SEA also said, "*Most of the learners here do not take their lesson seriously. If you give them work to do, some of them do not do it. It's an issue of wrong attitudes." SEC also said, "Some of the learners run away from school and some have no respect for educators. We are not allowed to beat them, we just have no solution to such problems."* It was clear from the insights of principals and educators that there were challenges associated with learners themselves that negatively affected learning in the schools.

Measures to Address Challenges

Participants were also required to share with the researcher what they were doing to address some of the challenges that they faced in the teaching and learning of NS. PSA said, *"We try to involve parents in the learning of their children by calling them for meeting so that we explain to them the need to support the school but this is not always successful as some may not even come for meetings."* SEB said that, *"I always create extra time for my learners by coming early to school and leaving late so that I have more time with them"* and SEA said, *"When I have a learner who is totally neglecting his or her school work or is misbehaving, I normally call in the parent to talk about ways to assist the child at school and at home."* In the light of the challenges they faced in the teaching and learning of NS, principals and educators always tried to find solutions.

Main Findings on Challenges Encountered in the Teaching and Learning of Natural Sciences

It emerged from the participants' responses that there were challenges of resources in schools and these impacted negatively on the teaching and learning of science. The realisation that schools did not have laboratories, science equipment and adequate textbooks points to serious problems in effective science curriculum implementation. It was found in the study that learners' background and the use of English as medium of instruction also negatively affected the teaching and learning of science. Lack of parental support was also another challenge. It also emerged from the study that time allocation for NS was not enough to cater for all the theoretical and practical work involved. Some challenges were related to learner absenteeism as well as lack of cooperation with teachers.

DISCUSSION

The study found that that laboratories and resources were not available and this was a major challenge in the teaching and learning of

Natural Sciences in the schools under study. The participants concurred that resources for science are not available. Idiaghe (2004) observes that availability resources and academic productivity in learners are closely related. In a related study to draw this relationship, Idiaghe (2014) established that learners in schools with inadequate teaching and learning facilities performed lower compared to their counterparts in schools with adequate facilities. The Department of Basic Education (2012) emphasises the importance of actually involving learners in the carrying out of investigations and arriving at conclusions through observation. Such learner involvement is possible in instances where equipment is available. In instances where equipment is limited, teachers should be encouraged to improvise. Knowledge and skills can still be imparted to learners through improvised equipment.

In showing the importance of appropriate resources in science teaching, Mudulia (2012) commented by saying that observation and experimentation are important approaches in science teaching and learning. Such approaches involve the learners actively in undertaking scientific projects and assist in developing their scientific literacy. Laboratories where experiments take place should be available in schools to ensure effective teaching and learning of science. The necessary apparatus should also be available as well as other materials required to carry out the experiments. Mudulia (2012) further notes that for effective science teaching, textbooks, revision books, lab chemicals and equipment should be readily available.

The study found that learners' deprived and rural background negatively affected the teaching and learning of NS. The data collected showed that the background really affected the teaching and learning of Natural Science in schools. This finding is consistent with results of international benchmark tests which show that South African learners were performing poorly in science and mathematics compared to their counterparts in other countries (Howie 2003). Such poor performance could be attributed to a myriad of challenges, which among them include poverty, resources, learning cultures, infrastructure of school and low teacher qualification (Reddy 2004). The participants showed a lot of concern on the challenges of poverty that enhance the poor background that is affecting teaching and learning in rural schools.

The study further found that use of English as the language of learning and teaching negatively affected the implementation of the NS curriculum. Science is taught in English and English is a foreign language to all the learners in rural schools. Research has shown that use of foreign language in teaching and learning results in numerous problems for learners. Taylor and Prinsloo (2005) underscore the challenges of learning in a second language, which results in learners' failure to interpret the meaning of Mathematics and Science concepts.

It is clear from the above view that teaching science in a foreign language results in learners' problems of understanding concepts taught. Similarly, Ong and May (2004) observe that the problem is worsened if the science teachers are not proficient in English. Teaching Science in English to second language English speaking learners negatively affects the learners' performance (Ferreira 2011). In a related study, Ferreira (2011) found that learners did not only experience challenges with English as a language but also with scientific language. The same view is shared by Schaffer (2007) who says that science lessons taught in English are language lessons as they involve learning both science and the language. This shows the major challenges that could be faced by rural learners learning science. Such learners do not grapple with science content only but also with a language that is foreign to them. Mokiwa and Msila (2013) further note that language has a strong effect on educational quality and rural and historically black schools in South Africa have the problem of the use of English as medium of instruction, which impacts on quality of education. Mutasa (2002) asserts that it is impossible for learners to understand and conceptualise content taught if the struggle with the language used in teaching the subject. The researchers agree with the foregoing statement because it is difficult for a teacher to impart the requisite knowledge and skills to learners where there is a language barrier.

Another finding highlighted by the study is that time allocation is not adequate to cover the subject content. The Department of Basic Education (2012) states that:

There seems to be an overlap between Geography and Natural Sciences, this might cause confusion for learners, when dealing with ei-

ther of the subjects. The four knowledge areas are clearly listed; this is a good guide for the teacher since it assists the teacher in knowing what the expected outcomes.

In addition the Policy document mentioned above highlighted that in terms of time allocation the document cite about the sufficient time that has been provided for teaching, assessment and projects; the content is brief and might need the teacher to be creative in expanding on the content to make sure that learners have a three dimensional understanding of the content, fortunately enough time will be available for such since the content is rather manageable.

The Department of Basic Education (2012) also mentioned the general strength about NS such as a good flexible assessment guide is helpful for the teacher; the flexibility of the guide allows for the teacher to be creative in teaching the content and also because of the manageable time allows for individual student attention in schools where student numbers are small. The researchers are of the view that the time factor is a challenge according to the data collected and it raises concern as it is not easy to come with the solution because it depends on the Department of Education.

CONCLUSION

The meaningful teaching and learning of Natural Sciences in rural schools is negatively affected by a multiplicity of challenges. Some of the challenges such as lack of requisite infrastructure and resources are so fundamental that they render the teaching and learning under such circumstances nearly impossible.

RECOMMENDATIONS

In the light of the findings of the study, the following recommendations are made;

- Basic infrastructure should be made available in rural schools in order to ensure that electricity, running water and science laboratories are available to enable proper teaching of science.
- Teachers should try to link the teaching of science concepts to what learners already know in order to enhance learners' understanding of concepts.
- Learners should be aided by having glossary of terms available for science terms in their mother language. This will go a long way in assisting learners to understand science concepts.
- Science clubs and other motivational measures should be introduced to motivate learners and inculcate their interest in learning science.
- More time should be allocated for science teaching in the school curriculum to enable adequate coverage of all syllabus requirements including practical work in science.

NOTE

*This article is derived from a Master of Education dissertation submitted to the University of Fort Hare in 2015. The student's name is Nomxolisi Mtsi and she was supervised by Prof C. Maphosa

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