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Educators and Learners Perspectives on the Factors that Influence the Teaching and Learning of Life Science and Physical Sciences at FET Schools: A Case Study of an FET School in Mpumalanga Province, South Africa

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RUNNING HEAD FACTORS THAT INFLUENCE TEACHING AND LEARNING OF SCIENCES

KEYWORDS Teaching, learners, Pedagogy, Challenges, Science Education,

ABSTRACT A survey was conducted at Mandlethu FET School in Mpumalanga Province of South Africa to determine factors that affect teaching and learning of Life Science as well as Physical Science at the school. The study also sought to identify possible support from the learners' view point that is needed to improve on the teaching and learning of Life and Physical Science at the same school. Face-to-face interviews with learners and the two educators using questionnaires were used to collect data for this study. The present study identified several factors that hinder effective delivery of tuition, and these include but are not limited to; language barrier, poor pedagogy and home related factors. Other factors that were identified as problem areas include; lack of laboratories, inadequate educational background of learners and parents and lack of career guidance for the learners. It is recommended that the educators improve on

their teaching skills so as to enhance teaching and learning, which has the potential to result in improved performance by the learners.

INTRODUCTION

In South Africa, the basic structure of the National Qualification Framework (NQF) consists of the General Education and Training (GET), Further Education and Training (FET) and Higher Education and Training (HET) bands. The FET refers to education and training provided from Grades 10 to 12, including career-oriented education and training offered in technical colleges, community colleges and private colleges (<http://www.westerncape.gov.za/general-publication/fet-college-information>). The training at FET level is specifically designed to provide for intermediate to higher level skills and competencies to promote the integration of education and training, and to enhance learner mobility and progression between GET, HET and the work place (Anon 2001).

In relation to training teaching and learning at FET schools, several studies have identified factors that are associated with poor performance of high school learners, and these include but are not limited to; poor teaching strategies, poor knowledge of the content by teachers, lack of student motivation, lack of laboratories and failure to integrate the use of laboratories in the teaching and learning, failure to complete the syllabus in a year, poor or lack of parental involvement in learners education and language problems (Mji & Makgato 2006; Moloi et al. 2010; Mbajiorgu et al. 2014). According to Legotlo et al. (2002) and Mbajiorgu et al. (2014), stakeholders in South African schools perceive that students do not perform due to lack of resources, lack of discipline on the part of the learners, poor morale among teachers and learners, problems concerning implementation of policies and inadequate parental involvement.

The internal locus of control which is associated with better attitude, motivation, time management and better self-control is also thought to contribute to improved performance. Where internal locus of control is lacking performance in academic related activities is bound to be poor. As suggested by Ghazvini & Khajehpour (2011) this internal locus of control is responsible for girls generally performing better than boys. Teaching and learning are dynamic processes that need to be regularly adjusted to meet the changing needs and opportunities in the area (Kidane & Worth 2012). However search for work done on studies that considered factors

that impact on teaching and learning of science subjects at FET school level yielded very few peer reviewed articles. This implies that knowledge of teaching and learning of science subjects at FET schools in South Africa is limited. In view of this, the objective of this study is to investigate educators and learners perspectives on the factors that influence the teaching and learning of life science and physical sciences at FET schools. It is envisaged that this research will be used as a tool to help the educators reach the common goal of assisting learners to do their best in Life and Physical Science at Mandlethu FET School and elsewhere in South Africa. Furthermore it is also envisaged that by investigating such factors, training of learners who understand and are capable of passing Life and Physical Sciences at Grade 12 Senior Certificate level will be fostered as well as improvement of science subjects at tertiary institutions.

MATERIAL AND METHOD

Study Area

This study was conducted in Vlaglaagte 1 in former KwaNdebele homeland, Mpumalanga Province of South Africa. The area is rural and characterized by small-scale livestock and crop production. The people live mostly in organized settlements.

Sampling and Data Collection

This study was conducted in 2012 at Mandlethu FET School in Mpumalanga Province of South Africa. To control for variance across the schools and teaching methods, one FET school located at Mandlethu was chosen for this study. The sample population consisted of pupils enrolled for Life Science (n=28) and Physical Science (n= 13) and two educators (n=2) who are involved in the teaching of Life and Physical Science.

The questionnaire used in the collection of data was developed in Microsoft Excel Version 7® (Microsoft Corporation, USA). A pilot study was conducted to test the relevancy of questionnaire on 20 grade 10 Life and Physical Science learners from the school. The results from the pilot study were included in the final results and also used to amend the questionnaire so as to make the wording of the questions for easier understanding. Interviews lasted between 30 to 60 minutes. Questions presented to the learners consisted of both open and closed

questions. The learners were asked questions related to why they chose to study Life and Physical Sciences, the challenges they face as a learner pursuing Life and Physical Sciences in the school understudy. Learners were also asked to list possible support strategies that they thought were needed so as to improve on the teaching and learning of life and physical sciences at the school in question. Primary data obtained from the educators (n=2) included the following: number of learners taking Life and Physical Sciences in all the grades (grade 10 to 12), and the challenges encountered during the teaching of Life and Physical Science at the school in question.

Ethical Considerations

Permission to conduct the study was secured from University of South Africa (Unisa) Ethics Committee. Further permission was sought from the school management and the respondents who were informed that their involvement in the study was voluntary and that they were free to withdraw their participation in the study at any stage if they felt uncomfortable. In addition, they were assured of anonymity in the research report

Data Analysis

Completed questionnaires were retrieved and analyzed qualitatively using Tesch's open coding method of data analysis to identify themes and categories (Creswell, 2010). It is a systemic process of examining, selecting, categorizing, comparing, synthesizing and interpreting data as described by Yin (2009) White (2002) and Leedy and Omrod (2012) to describe the factors that impact on the teaching and learning of Life and physical sciences at an FET School in Mpumalanga Province of South Africa.

RESULTS AND DISCUSSION

The Educators' perception of the factors that impede on teaching and learning

According to the educators that were interviewed, factors that impede on teaching and learning of Life and Physical Science can be classified into 4 themes.

Challenges in teaching

The educators tasked with teaching of both Life and Physical Science felt that they do not have the necessary skills to handle the subjects in question. Further probing by the interviewer also revealed that the educators find teaching of physical science difficult as it cannot be translated into IsiNdebele for learners, and that they lack assessment tools (such as a question bank) that they can use to assess the learners. The views expressed by the educators are confirmed by authors who also hold the view that if a subject is explained in the learners' home language it impacts on the performance in the subject by learners (Moloi et al. 2010). Therefore, for subjects like physical science that might not have appropriate words in the local dialects, it makes sense that the educators identified it as one of the factors that impede teaching and learning. In view of this, there is a need to re-train the educators to help them improve on their teaching of physical science. The training offered would include equipping the educators with the correct teaching techniques, how to conduct practical investigations and interpretation of practical results while explaining terminology that students find difficult to grasp. Moloi et al. (2010) also observed that it is important to have the correct pedagogical aspects like student and teacher motivation, student empowerment, entrustment, commitment and togetherness in place.

Language barriers

The educators who were interviewed made the following general comments;

‘...the learners find it difficult to cope with English’

“..learners cannot define basic physical science terms”,

What is evident from the two quotes, is that the use of English as a medium of instruction is a barrier to teaching and learning. This was also observed by Mji & Makgato (2006). This could be attributed to the fact that for education purposes, the role assigned to indigenous languages as the medium of instruction at initial stage has been usurped by English because of a combination of factors ranging from lack of will to enforce the provisions, to the prestige attached to English. Linguists lament that many education entrepreneurs have excluded the teaching of indigenous languages from the curriculum. These languages, according to language experts, are seen as vernaculars and are prohibited. One of the implications of ‘straight for English’ policy in education experts observe is that learners would at best acquire basic interpersonal communication skills (BICS) and not cognitive academic language proficiency (CALP). In addition, Linguistic scholars have also posited that language is the key to the heart of the people

and a potent instrument to unlock their knowledge, treasures and potentialities (Dare, 2013). If this is true, then it can be argued that multilingual countries like South Africa are in a position to record a high rate of success in science education and consequently develop at a higher and faster rate if due attention is given to indigenous language development as a medium of instruction in science education as well as in-cooperation into the curriculum.

Education and family background of the learners

The educators seem to hold a view that the back ground of the learners does impede on their ability to cope with their studies. This is implied from the quotes below:

“...majority of students were not exposed to many concepts due to their poor family background”,

A “....a lot of these have to do with poor parent involvement, poor socio-economic status and background of parents”.

Given the location of the school, there is merit in the thinking on the part of the educators that the education background of the learners is a hindrance to teaching. This is because when learners come to start doing Life and Physical Science at FETC level, they are usually not well prepared and will not have been exposed to most concepts. This is because the standard of primary schooling in South Africa particularly in formally disadvantaged groups is of a low standard (Makgato 2007).

On family background, less than adequate parental support for the learners by their parents in rural based schools has been highlighted by several authors (Mbajorgu et al. 2014; Mbajorgu et al. 2012) as being a problematic area in the teaching among rural schools. This has been confirmed in an article entitled “Stakeholders’ perception” (Legotlo et al. 2002). Similarly, Moloi et al. (2010) is of the view that parental involvement plays a role in performance of learners. This has been attributed to both poor socio-economic status and educational background of the parents (Mbajorgu et al. 2014). It is further argued that in rural areas like where the school under study is located parents do not have time to adequately support their children with school work. In view of this the educators opinion seems to be convincing and viable in the present study.

Lack of carrier guidance for the learners

As seen from the quote below, the educators felt that most learners are not properly counselled on which subjects to take.

"...the majority of learners did not have proper career guidance to choose the right subjects.

In agreement with these findings, Mbajorgu et al. (2014) in a study on factors that impact on the teaching and learning of Agriculture at an FET School observed that some learners elected to study Agriculture Science because they were forced to and not because it is a field they have interest to study. Based on the findings by Mbajorgu et al. (2014) and those of the present study it is evident that learners in FET Schools do not receive sufficient career guidance when they choose the subjects to pursue at this level. The consequence of this is demotivation of learners, which with all likelihood translates in poor performance by the learners.

Assessment of Factors that Influence the Learners Attitude towards Teaching and Learning of Life and Physical Science

In analysis of the factors that influence learners' attitudes towards physical and Life sciences, the following 4 themes were identified. These include language barriers, lack of laboratories, poor teaching skills, and home environment.

Language barriers

In this study learners revealed that the language of instruction poses a barrier in learning of physical science and life science. The language and textbooks used in teaching and learning are only in English which is a second language to learners. Given that terminologies used in physical science and life science cannot be translated to their vernacular language (IsiNdebele) as discussed above, makes the learning of these subjects difficult. Mji & Makgato (2006), arrived at the same conclusion, noting that learners often find it difficult to understand the concepts used in physical science. This is attributed to the fact that the language used especially in science in particular is difficult to translate into local dialects thus causing confusion and misinterpretation. The issues of language as a barrier to learning among students was also cited by Mbajorgu et al. (2014), who noted that language of instruction often poses a barrier to learners when it is a second or third language as is the case in the current study. Better performance of learners can be

expected if the subject can be explained in the learners home language as suggested by Moloi et al. (2010).

Lack of laboratories

Legotlo et al. (2002) states in their article on "Stakeholders perceptions" that lack of resources plays a role in grade 12 performance in South Africa. Lack of understanding of curriculum has also been attributed to lack of equipped laboratories. The learners revealed that lack of laboratories at the school makes the understanding of mechanics, momentum, electronic configuration, electricity, force and calculation difficult. Laboratories are very essential in simulating the abstract concepts of physics and life science to improve understanding of concepts, attitude and adapting them to daily life. The advantage of laboratories lies on the fact that during experiments learners learn by discovery as opposed to passive listening (Kaya & Boyuk 2011). Mji & Makgato (2006), support this view by confirming that practical work augments learning by supplementing what is in the textbook. Kaya & Boyuk (2011) also argue that lack of practical classes negatively affects learner's attitudes towards the subjects and consequent uptake of the subjects at higher levels.

Poor teaching skills

Poor teaching skills were cited as another factor affecting learner's attitude towards teaching and learning of both subjects in the current study. These include inability of teachers to answer learner's questions, lack of quality feedback on the assessments, poor writing skills and lack of patience. These findings are comparable to the findings of Mji & Makgato (2006); Burgoon et al. (2011), Siyepu (2013) who reported that South African teachers lack the necessary content knowledge and understanding of the subjects they teach. This in turn impedes on their ability to assist the learners to gain understanding of the difficult concepts of these subjects. Burgoon et al. (2011) confirmed these findings by arguing that lack of content knowledge amongst physical science teachers results into misconceptions of the subject and inability to identify and address the misconception of their students. Gill & Bell (2013) claim that lack of specialist physical science teachers' results into poor foundation in the subject amongst learners thus negatively affecting the understanding and performance thereof. This leads to a vicious circle as students with poor foundation are less likely to study the subject further, thus reducing the pool of

potential teachers (Gill & Bell 2013). Additionally, learners reported that teachers are too fast and often shout at students during lessons. (Mji & Makgato 2006) observed the same phenomenon in their study in which they mention that good teaching practices and good relationship with learners builds on confidence and motivates learners.

Home environment

It was reported in this study that homes are not conducive environments for learning. Learners have chores after school and this in turn restrict the amount of time they have for their studies. According to (Mbajorgu et al. 2014) these chores leave learners tired and unable to study at home. These findings confirm the views of authors who found a positive correlation between a pleasant home environment and performance of learners (Mishra & Bamba 2012; Borah 2013). Home environment was found to play a significant role on academic performance of learners by Mishra & Bamba (2012) in their article titled “Impact of home environment on academic achievement of secondary school students in science subject”. In their study these authors compared learners of different family environments and found that those that had enriched family environment had higher academic achievement. Borah (2013) further argues that home environment that is characterised by support, caring, affection and encouragement towards learners is essential in unleashing academic excellence.

CONCLUSION

The results of the survey present interesting findings in relation to the way in which educators and learners perceive the factors that influence the teaching and learning of Life Science and physical sciences at FET Schools. In this regard the main findings amongst others based on responses of both educators and learners that were similar include the following; language barrier, poor pedagogy and home related factors. Other factors that were identified as problem areas include; lack of laboratories, inadequate educational background of learners and parents and lack of career guidance for the learners.

RECOMMENDATIONS

We thus recommend that:

Higher education language policy should give consideration to the development of indigenous languages as a medium of instruction for life and physical sciences especially in former disadvantaged black schools. In addition, it is also imperative to instil the idea across the educators that learner support is of paramount importance. This is so because perceptions and responses held by the learners were indicative of a need for educator training on learner support. Also noteworthy is the lack of laboratories which needs to be addressed as a matter of urgency. We therefore submit that educator empowerment and training must become essential components of the strategies to deal with the factors that affect the teaching, learning and understanding of life and physical science education in FET Schools. Lastly it is recommended that the educators need to be accommodative with the learners in the following ways; be patient with learners, need to speak slower, be approachable, focus on the class, go over certain topics if the learners request for it and improve handwriting when writing on the board for the learners to be able to read or copy. Finally, this study yields important lessons for the educator-learner and the FET schools at large and it is encouraged that further research on this issue be instituted at other FET schools in South Africa and elsewhere.

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