



Factors Affecting Performance of Learners in Physics and Biology Subjects in Community Day Secondary Schools

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ABSTRACT

This study investigated factors affecting performance of learners in Physics and Biology subjects in Community Day Secondary Schools. Using a mixed method design, samples were chosen purposefully in four Community Day Secondary Schools. The schools identified were schools that underperformed in the science subjects in the year 2014. Senior science teachers and Senior science learners participated in this study. The data were collected by means of two closed-ended questionnaires. One of the questionnaires was designed for completion by the teachers (3) and one by the learners (98). In addition, structured interviews were conducted with eight teachers and eight learners. The data were analyzed using SPSS and manual analysis. The data were recorded and summarized by means of descriptive statistics and was interpreted using literature review. The results of this study indicate that factors that contribute to poor performance are, namely a change in the curriculum, the time allocated for each science topic, the teachers' teaching load, resources, the educators' lack of specialized content knowledge, the medium of instruction, the involvement of the parents, poverty, and motivation. From these results recommendations for policy were suggested.

Key words: parental involvement, poor performance, science, specialized content, medium of instruction,

Introduction:

The poor performance in science subjects and the low enrolment rate in the science faculties at tertiary institutions is a threat to Malawi's development and economy. This observation calls for an investigation into factors affecting performance of learners in Physics and Biology subjects in Community Day Secondary Schools. In order to make efforts to improve the science pass-rates in Community Day Secondary Schools be done appropriately. This then calls for Malawi to shape its science educational policies by emulating the education systems of the best achievers using international comparison strategies (Lemmer & Van Wyk, 2010).

The performance of community day secondary school learners is determined by the matric results, and the matric results, in turn, determine whether the district performs well or poorly in education.

Community day secondary schools, located in remote areas of Malawi continues to perform poorly, especially in science subjects. This presents a huge concern, as we are living in a world that requires from the students to be literate in science, since science has been identified as one of the key subjects in the global economy (Muzah, 2011; Adaramola, 2011; www.investopedia.com).

Research has indicated that school-based factors (the availability and use of teaching/ learning facilities), socio-economic factors (the education of the parents and their economic status), student factors (motivation and attitude), school type and the teachers' characteristics level of performance of students at Primary School Leaving Certificate of Education (PSLCE) selection to Community Day Secondary Schools as the factors that contribute to the learners' poor performance in the science subjects.

This study was designed to do research on factors affecting performance of learners in Physics and Biology subjects in community day secondary schools.

Research methods

Merriam (2002) defines *sampling* as the selection of a research site, time, people or events in field research. She further explains that the number of participants in a sample depends on the questions being asked, the data being gathered, the analysis and the resources available to support the study (Merriam, 2002; www.simplypsychology.org).

Although many sampling methods exist this study made use of purposeful sampling, which is a sampling method that involves the researcher selecting subjects with the required characteristics (McMillan & Schumacher, 2010).

The problem statements

The high failure rate of the learners, specifically in the science subjects, continues to be a threat in Community Day Secondary Schools. Factors leading to the poor performance need to be researched, as they continue to be to the detriment of the learners in Community Day Secondary Schools.

Objectives of the study

The aim of the study was to investigate the factors affecting performance of learners in Physics and Biology subjects in Community Day Secondary Schools.

The research question

The research question for this study was: What are the factors affecting performance of learners in Physics and Biology subjects in Community Day Secondary Schools?

Summary of the findings

This study explored the factors affecting performance of learners in physics and biology subjects in community day secondary schools.

It sought to answer the question “What are the factors affecting performance of learners in physics and biology subjects in community day secondary?”

Learners in community day secondary schools regard this subject as very difficult and also perform poorly. This made the need to discover factors behind their poor performance a very important exercise.

Research findings have identified school-based factors (the availability and the use of teaching/ learning facilities), socio-economic factors (the education level of the parents and their economic status), student factors (entry behavior, motivation and attitude), the school type, and teacher characteristics as factors that affect performance of learners in physics and biology subjects (Kibet et al., 2012).

The main findings as indicated in section 4.5 aimed to answer the research question, “What are the factors affecting performance of learners in physics and biology subjects in community day secondary schools?”

The major factors that were discovered to be the cause of the learners’ poor performance were, curriculum factors (changes in the curriculum), school factors (the time allocated for each science topic, the teachers’ teaching load, the lack of resources, the medium of instruction,), teacher characteristics (the teachers’ lack of specialized content, motivation), socio-economic factors (parental involvement, poverty)and minor factors were learner factors (absenteeism, early parenthood by learners, gender, performance of students at Primary School Leaving Certificate Education(PSLCE).

Curriculum Factors

Changes in the curriculum

The research revealed that changes in the curriculum interfere with the teaching experience of the teacher because each and every new curriculum has specific teaching strategies. Teaching experience is also an important factor that enables teachers to choose the effective teaching methods that match the learners’ needs, and are tools that allow them to identify strategies to assist the learners with special needs. Every time a new curriculum is introduced the teachers have to adapt to new strategies. Hence, experience can

only be considered as a number of years and not as contributing to effective teaching. This study regards *changes in the curriculum* as having a negative impact on teachers, whether they agree with it or not. In reality, new topics are introduced and you cannot teach the new curriculum in the previous manner. If the teachers are affected negatively by changes in the curriculum this will also have a negative impact on the learners, because teaching and learning is an interaction between a learner and a curriculum facilitated by a teacher.

The findings of this research mentioned above correlate with the findings by Moodley (2013) who said that the teachers are not adequately trained in respect of the new curriculum. School factors

Time allocation

The results from this study indicate that the time allocated to teach and learn science is not enough. The teachers stated that science concepts needed more time to be explained. Assessment methods

The study indicated that science is being assessed theoretically. Even the experiments are done theoretically. This means that learners do not interact with the scientific material and are not allowed to discover the concepts by themselves. They do not do experiments.

The teachers' teaching load

The results from this study indicated that the teachers in community day secondary schools are overloaded; they not only teach science but also other subjects. This leaves the teacher overworked because science needs a lot of practice. This indicates that the learners should be assessed regularly (Yelkpiri et al., 2012).

Resources

This research indicated that the learners of community day secondary schools lack the necessary resources to aid them in their studies. These resources range from resources at home and at school. Nowadays the social media, TV and radios broadcast academic programs which may assist the learners in their work. However, the majority of the learners in community day secondary schools do not have these resources at home, meaning they only interact with academic matter at school.

Medium of instruction

The vocabulary of science and English are identified as different languages. The learners in community day secondary schools have a challenge with these two languages because they prefer being taught by means of code switching. Exams and tests are written using both English and science languages and during assessment no code switching is done. This disadvantages the learners because they may not understand the questions nor be able to express themselves efficiently. Science is a subject that requires one to grasp the concepts and be able to communicate them in writing. It also requires one to analyze data from diagrams and communicate them in words, and to know the theories and be able to apply them (Hlabane, 2014). Therefore, a lack of proficiency in English also results in the learners being unable to communicate their ideas (Hlabane, 2014).

Teacher characteristics

The educator's lack of specialized content

The findings from this study indicate that most of the teachers in community day secondary schools only have knowledge limited to teaching the syllabus and hence cannot extend their clarification further to the children rather than what is in the syllabus. Such a lack of specialized content knowledge is a disadvantage.

Motivation

The teachers in community day secondary schools are faced with many challenges when it comes to teaching science which results in them working overtime. The Science department does not recognize this dedication and effort in a form of salaries, allowances or by supporting teachers towards professional development. Research shows that teacher motivation is very important towards the academic achievements of the learners as it motivates the learners, because a motivated teacher has a passion for his/her job (Mart, 2013; Chux et al., 2013). According to Lebata (2014), the science subjects need a lot of passion and dedication from the teachers as they should take their time in guiding learners through challenging concepts of science which are seen as difficult, boring and irrelevant and they should make them interesting.

5.1. Socio-economic factors

Parental involvement

Parental involvement in community day secondary schools is limited because the parents only attend parent meetings. They cannot assist their children with their schoolwork (Figure 4.19; Table 4.5) because they do not understand the syllabus and this leaves them not knowing where to assist. Results about parental involvement show that the communities in areas where Community Day Secondary Schools are located do share a common goal with their schools but are their involvement in the schools is limited by factors which are characterized as characteristics, philosophies and practices of the family see the theory of overlapping spheres (Mahomed, 2004:4; Makgato & Mji, 2006) . This limitation of parental involvement has a negative effect on a learner's education.

Poverty

Many of the learners in community day secondary schools live in overcrowded homes, with very few resources. Their parents mostly are uneducated and unemployed. These findings of this research confirm the findings from previous research which state that poor parents have little or no education (Chinyoka & Naidu, 2014). This results in parents being unable to assist their children with schoolwork. Research by Chinyoka & Naidu (2014) also show that poor homes are usually overcrowded, with the same sexes sharing a room. This can result in the learners not having adequate space to study or to do their homework nor interact with their peers at home in relation to school work. The learners often can only afford the basic schooling material and nothing more. The learners cannot be helped by their parents, nor can their

parents afford tutors for extra lessons when they struggle. The only chance they have for learning is at school which is of limited hours Therefore poverty contributes negatively towards their performance.

Learner factors

Absenteeism

Results show that only a few learners absent themselves from school. Even though they may be a few, but this has a negative impact on their performance. When learners are absent teaching and learning continues and this results in absent learners being left out and they lack the knowledge that was taught during their absence (Muzah 2011, Cho et al, 2012)

Early parenthood by learners

This study shows that a minority of learners get pregnant during matric. Even though pregnancy affect a minority, it may have a negative impact on their teaching and learning. A learner who is a parent is required to take care of a child and also study, this can result in study time being reduced as the learner plays a parental role. Less time spent on studying compromises the quality of a learner's performance.

Gender

The majority of learners in science classes are girls. Teacher's responses in the study indicated that girls experienced difficulties during science lessons because they are afraid to ask questions and they also see science as an abstract subject. This has a negative impact on their performance.

Limitations of the study

Even though the findings answered the research questions, the study had limitations. It included the sample size, the research tools and the components that were investigated in community day secondary schools were not varied.

The study was done in only four community day secondary schools, which is a small number of community day secondary schools in Malawi. Only a limited number of educators participated in the study. These limitations were due to the researcher's time constraints, budget constraints, and the vastness of the area.

The study only investigated the school component, namely the teachers and learners. It did not involve other components of the Department, such as the curriculum component which includes the subject specialists and the subject advisors. Therefore, information that was gathered was only from the school perspective and lacks information from science subject specialists

6. Recommendations and Conclusion

Recommendations from the study:

The science teachers in the rural areas more especially in community day secondary schools should receive incentives. This will not only motivate them but will also attract other good science teachers from

the urban areas to teach science in the rural areas more especially community day secondary schools. Science teachers should also be given bursaries to further their studies part time and should have their salary notch raised as they improve their qualifications. The Ministry of education should recruit science teachers from science faculties and give them bursaries to enroll for post graduate certificate in education (PGCE). This will lead to employment of good science teachers in the ministry of education.

When a new curriculum is being introduced, the teachers should be trained on how to disseminate it through courses that include training on the content, teaching style, approach and the learning material to be used. The courses should be made compulsory and be part of education's policy. The courses should be implemented a year in advance before the actual curriculum change is effected. This will allow the teachers to be able to meet the objectives of the new curriculum. Efficient training of teachers before the implementation of the curriculum will mean that the learners will get the quality education in terms of the curriculum being introduced.

The teachers should be trained on methods that should be applied to teach in a manner that matches the cognitive load of science learners, teachers should also be provided with material that enables them to teach in a manner that matches a learner's cognitive load. The ability of teachers to teach in a manner that reduces the cognitive load of a learner will enable the learners to grasp all the concepts and content taught in forty minutes' period effectively and hence improve their performance in science.

Science teachers should only be given science subjects that they specialized with during their training. Their workload should be given in consideration to the time they need to prepare thoroughly for the science lessons. The workload should also be given in consideration to the time they need to assess the subject continuously and effectively. If teachers get adequate time to assess learners, they will be able to know where individual learners lack then they will be able to use diagnostic assessments to improve the performance of learners.

Tertiary institutions should include the actual subject content that the teachers will be specializing in during the teacher training modules for the first 3 years then the fourth year be training on teaching methods. This means that science teachers should do B.Sc. in their first 3 years. This will equip the science teachers with extensive science teaching knowledge and hence contribute towards the learners' improved performance in science.

Science literature (language) should be included as a subject as early as in the early learning phase. Knowledge of science language in the early stages of schooling will assist the learners in grasping the scientific concepts as they will no longer struggle with neither the scientific terminology nor struggle with understanding questions. The learners will be able to express themselves using science terms and this will improve their performance in science.

The Ministry of Education should have a program that allows parents to be involved academically in the schools, such as academic committees that assist in actual teaching and learning. The teachers should be trained how to involve the parents academically. The Ministry of education should outsource funds and

partner with non-government organization in order to build science laboratories and library centers, tutors and lab technicians should be stationed in each community day secondary school or district. This will cut the costs of purchasing science material for individual schools. The ministry of education should then formulate policies on how the center operates ensuring that all schools are catered for. The centers should also work as centers for tutors where other teachers can use to assist learners with work. This will assist in performing of practical work or teaching of extra work. It will also minimize the costs of building individual science labs in community day secondary schools.

Recommendations for further research

- Do research on the tertiary curriculum for science educators in order to improve on the content science teachers should be trained for.
- Do research on the role that can be played by Non-Governmental Organizations (NGOs) towards the involvement of the parents in academic activities and working hand in hand with schools to improve science performance. Do research about developing a relevant and effective science curriculum

Conclusion

This study explored factors affecting performance of learners in physics and biology subjects in community day secondary schools. It sought to answer the question “What are the factors affecting performance of learners in physics and biology subjects in community day secondary schools?”

The factors that were indicated to affect performance of learners in physics and biology subjects in community day secondary schools are namely: *changes in the curriculum, the time allocated for each science topic, the teacher's teaching load, the lack of resources, the lack of specialized subject content in educators, the medium of instruction, parental involvement, poverty, motivation among others.*

However, this does not mean that these are the only factors. There may be many other factors that may affect performance of learners in physics and biology subjects in community day secondary schools. The recommendations made in this study should be used by all components of the Science department of Education in order to improve the learners’ performance in science subjects.

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