British Journal of Arts and Social Sciences
ISSN: 2046-9578, Vol.8 No.II (2012)

http://www.bjournal.co.uk/BJASS.aspx

Performance Indicators of Secondary School Mathematics in Nyamira South District of Kenya

Yara, Philias Olatunde
Computer Science Department
University of Ibadan, Ibadan, Nigeria
yaraphilias@yahoo.com

Surumo, Thomas Nyauma
Kenya

Abstract

The study looked at the performance indicators of secondary school Mathematics in Nyamira South District of Kenya. These indicators are student discipline, teachers' qualification and experience and school facilities. The study employed the descriptive survey design approach with a population of 77 Mathematics teachers and 525 students comprising of 320 males and 205 females. Two validated research instruments (Questionnaire for Teachers (QFT) and Questionnaire for Students (QFS)) were used to gather data. Three research questions were answered. Data were analysed using descriptive statistics of mean, percentages and t – test analysis. The results showed that there was a negative relationship between student discipline and academic performance in Mathematics ($t = -5.820$; $p < 0.05$); there was a negative relationship between teachers' qualification, experience and academic performance in Mathematics ($t = -5.19$; $p < 0.05$) and there was also a negative relationship between school facilities and academic performance in Mathematics ($t = -5.709$; $p < 0.05$). It was recommended that the Government should provide more teaching - learning facilities in schools to make the learning environment more attractive to students and teachers; more teachers should be trained and encouraged to stay in rural areas.

Keywords: Student discipline, Teachers qualification, School facilities, Performance, indicators, Secondary school Mathematics

Introduction

Mathematics is a very important subject and it has very many applications in our everyday life. We use Mathematics consciously and unconsciously every day of our lives. It is studied in secondary schools as a compulsory subject. The current education system in Kenya is designed to achieve specific national goals. The recommendations of September 1981, saw the introduction of the 8-4-4 System. Kenya is aiming to be fully industrialized by the year 2030. If this goal is to be achieved, it means there should be better performance in sciences, of which Mathematics is part and parcel of. Even though Mathematics and its applications are so important in everyday life and in medical profession, its performance in Kenya Certificate of Secondary Education (K.C.S.E.) continues to be poor. It is a matter of concern to both the government and the general public that students continue to perform very poorly in mathematics at KCSE level. The government of Kenya attaches great importance to the development of the education sector, for it recognizes that education is a powerful tool for transformation of society. Education plays a key role in achieving moral, intellectual, ideological, cultural and social development of the people in society, as well as the national goals of unity, democracy, economic progress and security of all its citizens. Emphasis is put on the role of education in liberating people from the vicious cycle of poverty, dependence, ignorance, disease and indignity, and in the process of building a self reliant nation with a sustained independent economy.

The government notes with concern the problems it faces in its effort to cause rapid development of education. According to Education White Paper of 1992, the quality of education has been seriously eroded at all levels due to civil strife and economic decline. Schools are ill-equipped, instructional materials are in short supply, teachers are poorly remunerated and many of them are unqualified or incompetent. Although the government has undisputed need for bringing about the desired changes and improvement in the system of education, it is at this stage that she is having severe resource constraints. It is therefore quite a challenging task to cater for the development needs of education. The Kenyan Human Rights Commission Report of 1999 noted that there are not enough secondary schools to absorb all children who qualify for secondary education. Many school administrators, overwhelmed with pressure from parents, admit large number of students which do not match with the available facilities and teachers. A lot of indiscipline problems have been reported in schools due to unmanageable numbers.

In the UNESCO magazine of 2001, it was argued that education has become a powerful catalyst for change at all levels of society but its characteristics and form present new challenges and policies. The challenges are manifested in form of educational accessibility, relevance, equity, qualification and its governance. Chaube (2000) opined that it is the right of the individual to receive at least primary and secondary education which is important in democratization of any society. Secondary education is designed to provide children with the academic knowledge and skills they need to function successfully in society, to prepare them to pursue further education, to enter the work force and to be responsible active citizens. If students do not receive the knowledge and skills they need to be productive, then the schools have not succeeded in their mission. According to the Ministry of Education Science and Technology (MOEST) report of the third Teacher Education Conference in Nyamira in 1995, the teacher's performance heavily depended on a number of factors including staff development programmes that are in place at a given time. According to data obtained from Nyamira South District Education Office, teaching of mathematics is likely to be deficient as reflected in the poor performance of students in KCSE results of all the previous years.

Related literature

In recent years, policy makers, educators, parents and students increasingly have expressed concern about the incidence of school related criminal behaviour. Although concern has grown, several studies have shown that violent behaviours, smoking, and theft have increased especially in secondary schools (Kasozi, 1997). School discipline has a diversity of connotations, as many people perceived it to mean many different things. According to Kasozi (1997) discipline refers to a situation

of remaining inside legal bounds of law as laid down by the school administration. Musaazi (1982) emphasize the need for orderliness in the school. They emphasize that students, teachers, school employees and administrators should all be orderly as school discipline and good academic performance is a collective responsibility and a prerequisite for school success.

The Kenya Education Policy Review Commission Report of 1992 clearly spells out discipline as one of the aims and objectives of education at all levels of the education system. According to Mafabi (1995), discipline is the underlying factor in all school activities; they cannot be pursued without it. In the absence of discipline, there is anarchy; a situation which makes it impossible for a school goals to be achieved. Most of these studies emphasized the need for discipline as a prerequisite for school success; however, they do not explicitly illustrate how discipline can be enforced in the school setting. School authorities should not only stress the importance of discipline, they also need to put mechanisms of enforcing it. Okumbe (1998) described discipline as the action by management to enforce organizational standards. He stresses that all members of educational organization are required to strictly adhere to the various behavioural patterns necessary for maximum performance. In support of this, Chaube (2000) contends that an opinion may be formed about the school by observing the discipline among students. It is necessary for every school to enforce certain rules of conduct to ensure discipline is essential if rules are to be implemented.

According to Musaazi (1982) student discipline means that students are provided with an opportunity to exercise self control to solve school problems, to learn and to promote the welfare of the school. Ssekamwa (2000) in agreement with Musaazi adds that discipline is the development of self worth, self control, respect for self and others and the adherence to the school routine set up in terms of schedules and school regulations. It is very important for school authorities to give freedom to the students to develop the self esteem and exercise self control. There are many school authorities who use this approach to enforce discipline in schools. It is our considered opinion that this method could be effective for post secondary school students and may not be appropriate for secondary school students. According to Mafabi (1995) symptoms of indiscipline include habitual absenteeism from class and from school as a whole, late coming, telling lies, rudeness, vandalism, aggression, smoking and drinking while at school, evading school activities, bullying of new students, indecent forms of dressing. These, however, do not explain how these behaviours affect academic performance because there are many students involved in these kinds of bahaviour and still perform well. Many students attending public schools exhibit discipline problems such as disruptive classroom behaviour, vandalism, bullying, and violence. Establishing effective discipline practices is critical to ensure academic success and to provide a safe learning environment. Antisocial behaviour, academic underachievement, and poor development of pro-social skills among students attending most of our nation's public schools remain a concern for educators, parents, and the lay public. Problems such as violence, vandalism, bullying, and similar behaviours create an unsafe learning environment, undermine instruction, and pose a threat to the school population.

Studies have also shown that early onset of discipline problems in school children predicts later maladjustment. Thus, children who engage in antisocial behaviours at a young age are more likely than their non-aggressive peers to respond similarly when older and as adults. The concern about student discipline has produced many intervention and prevention-focused programs to improve character and moral development, promote exemplary social skills, reduce antisocial behaviours, and strengthen academic competencies. Unfortunately, many of these programs have conceptual limitations and were publicized without supporting empirical data, or had minimal to no positive effects when evaluated objectively through randomized controlled trials.

Craig et al (1998) holds the view that the teachers' qualification determines the students' achievement. Factors such as the years taken to train teacher, the teachers verbal fluency, subject matter knowledge, having books and materials, knowing how to use them, teacher expectation of pupil performance, time spent on classroom preparation and frequent monitoring of student progress

determine the qualification of performance of a teacher. Regardless of the training, the experience and the preparation undergone, a teacher should have adequate motivation to teach. Lack of incentives in schools and small salaries offered to teachers compel them to work in many places to make ends meet. This renders many teachers ineffective at their work. The Common Wealth Report of 1974 was of the view that teacher competence as having knowledge of child development; of the material to be taught and suitable methods; his skills must enable him to teach; advice and guide his pupils, community and culture with which he is involved; his attitudes should be positive without being aggressive, so that his examples are likely to be followed as he transmits explicitly, and implicitly the national aims and moral and social values. In support of this, Konchhar (2001) contends that discipline problems cannot be prevented yet most of them will not arise in the classroom of intelligent, hardworking, teachers who plan their work effectively, motivate their students skillfully and provide a friendly environment. Brinkerhott and White (1988) argued that teachers have the authority to control what goes on in classrooms and that authority must be established with each separate class. Some teachers are unable to do this as their classes run wild and their students terrorize them.

Anderson et al (1992) contends that nothing is more critical to the quality of school than its staff. Teachers contribute to the whole development of children both inside and outside the classroom and not simply through the transmission of information and skills. Teachers need to interact with children even outside class. This instills confidence among the children in dealing with the teacher and enhances free interaction even in class. Many studies hold the view that on top of having deeper knowledge of and confidence in teaching their subject(s), the teacher should know how to teach mixed ability classes and how to respond to different learning styles of their pupils. It is from the above that many studies give many characteristics and qualities which effective teachers should posses. There are many students who perform well without teachers in some subjects while others with well-qualified teachers perform poorly. Studies have shown that the lowest-qualification teachers, as measured by this standard, tend to have higher rates of turnover and the more effective teachers tend to stay.

Another study finds that, on average, teachers who have been shown to increase their students' academic performance stay in the teaching profession longer and are not necessarily more apt to leave lower-performing, poorer schools. Although challenging environments generally increase the likelihood of teacher attrition, those teachers who are deemed more effective are also more likely to stay in these lower-performing schools (Goldhaber, Gross and Player 2007). Studies have also shown that these findings do not hold true for the most-challenging schools. Although effective teachers generally tend to stay in challenging schools, as teachers become more effective, they are more likely to move away from the most-challenging schools to schools with relatively lower concentrations of poverty and higher performance levels (Goldhaber, Gross and Player 2007). According to NCTAF (2003), teachers who work in poor schools, as determined by the proportion of students receiving free and reduced-price lunch, are significantly more likely to leave their school or profession than those who work in wealthier ones. Those teachers who work in high poverty schools have an annual turnover rate of 20 percent, while those in low poverty schools have a rate of 12.9 percent. Moreover, a MetLife survey finds that teachers "at-risk" of leaving the profession are also more likely to be teaching in urban, low-income schools with high concentrations of minority students (MetLife 2005). Low funding levels in high-poverty districts generally do not allow schools to offer competitive wages and often contribute to ineffective, bureaucratic recruitment and hiring procedures; challenging work conditions; and inadequate teacher supports. The lower turnover rates of effective teachers among challenging schools is encouraging. But students being served by the most-disadvantaged schools should not be neglected; neither should the teachers who have the desire and knowledge to contribute to students' academic achievement, but lack the tools necessary to do so. Instead, systems should be designed to ensure that the best teachers are teaching the students with the highest challenges and that teachers receive the training and support they need to help students succeed.

The success or failure of secondary schools is measured against the presence or absence of structures and facility provision and management. Nsubuga (1977) holds the view that an important element of a good school is that of facilities. He emphasizes that a good school should have adequate facilities which help the teachers to effectively teach and pupils to effectively learn in a convenient and comfortable environment. According to Konchhar (2001) physical facilities contribute a lot to the general atmosphere of the school. He suggests that healthy surroundings, good sanitary arrangement leave little scope for irritation. Adequate library and reading room facilities, special room for different subjects, common room and many more will keep the children busy and away from indiscipline. Musaazi (1982) agreed that most programmes of instruction and pupil services require some physical facilities such as school buildings, school grounds, enough desks, chairs, teaching materials and laboratories. The possession of adequate facilities in the school for studying is a characteristic of an effective school. However, there are many students who perform well in schools with limited facilities and there are also many students who perform poorly in schools which are well facilitated. The study therefore aims at looking at the performance indicators (school facilities, student discipline, teachers qualification and experience) and academic performance of students in Nyamira South District of Kenya.

Methodology

Research Design

The study adopted the descriptive survey design to investigate the indicators of academic performance of students in mathematics.

Population

The population of the study included students and teachers in the selected schools of the study. There are 45 secondary schools in Nyamira South District

Sample and sampling procedure

Using purposive sampling technique, five schools in each of the two divisions of Nyamira South District making a total of ten schools were selected for the study. The schools selected were representative of all the schools in the district. Using purposive sampling, 77 mathematics teachers and one intact class from each school were selected. A total of 525 students comprising of 320 males and 205 females participated in the study.

Instruments

Two research instruments were used to obtain data during the study. These are Questionnaire for Teachers (QFT) and Questionnaire for Students (QFS). QFT has two sections. Section A consists of 16 items that deals with the biodata of the teachers (like age, gender, number of students in the class, qualification etc) while section B consists of 4 items dealing with the quality of teachers and academic performance and 10 items dealing with the attitude of teachers towards their profession. QFS has two sections. Section A consists of 8 items that deals with the age, gender, class, attitude of students towards mathematics while section B has 6 items that deals with students' discipline and school facilities.

Research questions

1. What is the relationship between student discipline and the students' academic performance in Mathematics in selected secondary schools of Nyamira South District?

2. What is the relationship between teacher qualification and experience and the students' academic performance in Mathematics in selected secondary schools of Nyamira South District?

3. What is the relationship between school facilities and the students' academic performance in Mathematics in selected secondary schools of Nyamira South District?

Data analysis

Descriptive statistics of mean, standard deviation, percentages and ***t*** - test data analysis were used to analyse data.

Results and discussion

The results of this study are presented according to the research questions.

Research question 1: What is the relationship between student discipline and the students' academic performance in Mathematics in selected secondary schools of Nyamira South District? To answer this question, we first looked at the types of indiscipline in these schools. According to the results, the types of indiscipline are late coming (40.1%), dodging of classes (30%), escaping from school (25.3%), disrespect to teachers (3.6%) and others like vandalism, immorality, bullying, drug abuse, noise making (1%). The result showed that most students come late to classes either due to their own laziness or that they live far from their schools and as such had to trek a long distance before getting to school. A lot of the students even when they are in school dodge classes. This result showed that the students may not be interested in coming to school or that they may not like the particular teacher teaching the subject. This also showed that the subject may not be interesting to the students hence rather than stay in the class without assimilating anything; students decide to stay away from the class. The result is in support of Mafabi et al (1995) who opined that symptoms of indiscipline include habitual absenteeism from class and from school as a whole, late coming, telling lies, rudeness, vandalism, aggression, smoking and drinking while at school, evading school activities, bullying of new students, indecent forms of dressing.

Table 1: t - test analysis of discipline on students' academic performance

Parameters	Mean	SD	SE	t - ratio	P
Performance	34	1.87	0.134		
Discipline	24	1.71	0.121	-5.820	0.000

The results in Table 1 revealed that there is negative relationship between discipline and performance of students in mathematics ($t = -5.820$; $p < 0.05$). The mean performance of 34 as against discipline of 24 showed that the better the students discipline, the better the students' academic performance and vice-versa. Thus, students' academic performance is greatly influenced by their discipline at school. This result revealed that there is a negative relationship between student discipline and the academic performance in Mathematics in selected secondary schools of Nyamira South District of Kenya.

Research question 2: What is the relationship between teacher qualification and experience and the students' academic performance in Mathematics in selected secondary schools of Nyamira South District? We tried to answer this question by first looking at the qualification and experience of teachers and how the head teachers and students rate their teachers in terms of their preparation for the teaching in the classroom.

Table 2 showed the qualification of teachers.

Table 2: Qualification of Mathematics Teachers

School	Graduate teachers	Diploma teachers	Untrained teachers	Total
A	10(40%)	15(60%)	-	25(32.5%)
B	10(52.6%)	9(47.4%)	-	19(24.7%)
C	1(8.2%)	9(75%)	2(16.7%)	12(15.6%)
D	8(38.1%)	13(61.9%)	1(48%)	21(27.3%)
Total	28(36.4%)	46(59.7%)	3(3.9%)	77(100%)

From Table 2, the result revealed that most of the teachers are qualified to teach in the selected secondary schools as many of them possess the required qualifications to teach in these schools (graduate (36.4%) and diploma (59.7%)). Only 3.9% of teachers do not have the teaching qualification.

Table 3: Experience of Mathematics Teachers

	Frequency	Percentage
Less than 2 yrs	43	55.8
3-5yrs	10	13.0
6-8yrs	9	11.7
Above 8yrs	15	19.5
Total	77	100%

The results showed that 68.8% of the teachers have experience of less than 5yrs of teaching while 31.2% have more than 5yrs of teaching. This revealed that many of the teachers may have just been recruited into the teaching service of the selected schools. Many teachers do not like to teach in rural schools as these selected schools are not in the urban areas.

Table 4: Assessment of Heads of departments about Mathematics Teachers

Item	Strongly agree	Agree	Disagree	Strongly disagree	Total
Preparation of schemes of work	11	30	2	1	44
Giving exercises	12	28	2	2	44
Marking exercises	9	14	21	0	44
Making corrections with students	9	33	2	0	44
Completion of the syllabus	5	32	5	2	44
Total	46	137	32	5	120

The Table 4 showed the assessments of heads of departments about the performance of teachers in the four schools. 93% of the heads of departments were of the view that teachers make preparations for teaching while 6.8% commented that teachers don't make adequate preparations for teaching.

Table 5: Students' assessment of Mathematics teachers' performance

Item	Strongly agree	Agree	Disagree	Strongly disagree	Total
Explanation of subject matter concepts	41	54	9	1	105
Giving exercises	25	53	25	2	105
Marking exercises	40	46	17	2	105
Making corrections	20	56	22	7	105
Free interaction with students	31	41	20	13	105
Total	157	250	93	25	525

Results from Table 5 showed that 90.48% of the students were of the view that teachers explain the subject concepts thoroughly on the other hand 9.52% responded that the explanations of subject concepts were not clear. 74.29% indicate that teachers give exercises in class while 25.71% were of the view that teachers don't give exercises in class. Also, students revealed that 81.9% of the teachers mark exercises while 18.1% do not mark exercises. 72.4% of the students further held the view that teacher make corrections after marking the exercises while only 27.6% did not. This therefore means that students were satisfied with the quality of teaching.

Table 6: t-test analysis of teachers' qualification

Parameters	Mean	SD	SE	t-ratio	P
Performance	32	1.85	.131		
Qualification of teaching	26	1.74	.123	-5.819	.000

The result shows that the mean is 32 and 26 while the standard deviation is 1.85 and 1.74 for performance of students and qualification teaching personnel in the selected secondary schools respectively. It means that the higher the qualification of teaching personnel, the better the students' academic performance and vice-versa. Thus, students' academic performance is greatly influenced by the qualification of teaching personnel in secondary schools in Nyamira South District of Kenya.

Slavin, Evans as cited in Yara (2008) opined that a common hypothesis with respect to the relationship between teachers' experience and student achievement is that students taught by more experienced teachers achieve at a higher level, because their teachers have mastered the content and acquired classroom management skills to deal with different types of classroom problems. Furthermore, more experienced teachers are considered to be more able to concentrate on the most appropriate way to teach particular topics to students who differ in their abilities, prior knowledge and backgrounds. Also, Ejiogu, (1999) was of the view that in order to improve on any aspect of education, it is imperative to involve a well articulated teacher education programme that will prepare the teacher for the leadership role they are expected to play. Every nation's overall development is inextricably tied to its educational system. Most educationists believed that there could be no meaningful socio-economic development without the right type and appropriate quality of education. To become an educated person requires the combination of several factors and processes. At the center of the processes is the presence of an educator. The teacher is the most indispensable factor in the effective administration of any education system. In his opinion Ofofuena as cited in Yara(2008) said that no matter what amount of resources we might put into the nation's education system, without properly prepared and motivated teachers, we can never expect from the system.

According to Abimbade (1999) teachers are said to be effective when their teaching can lead to students' learning. Nothing has been taught until it has been learnt and this happens when the teacher succeeds in causing a change in behaviour in the learner. It is therefore important that the teacher must see teaching as an attempt on his own part to transfer what he has learnt to his students. Despite conventional wisdom that school inputs make little difference in student learning, a growing body of research suggests that schools can make a difference and a substantial portion of that difference is attributable to teachers. It is important to note that the various dispositions that our teachers display at work betrayed their devotion. This has greatly affected the attitude of students towards learning generally and in particular, the learning of Mathematics and hence their poor performance in the subject. Many have no mastery of the curriculum content and the organisation is highly detestable. Teachers' affective reactions to work are not as good as they should be in many of our schools and particularly in rural areas.

Research question 3. What is the relationship between school facilities and the students' academic performance in Mathematics in selected secondary schools of Nyamira South District? The students, head teachers and heads of department were requested to rate the adequacy of facilities in schools for teaching and learning. The results were summarized and presented in the Table 7.

Table 7: Adequacy of facilities in schools

Rating	Frequency	Percentage
Strongly agree	7	4.5
Agree	47	30.1
Disagree	71	45.5
Strongly disagree	31	19.9
Total	156	100%

The responses were from 109 students, 44 teachers, 4 head teachers and 5 directors of studies. From table 7 the respondents who were of the view that the schools had adequate facilities for teaching and learning were 34.6%, while those who were of the view that the facilities were not adequate were 65.4%. Interviews with head teachers revealed that schools depend mainly on fees from parents which are not even paid on time. Any capital developments in these schools are done from the fees raised. Most of the parents are poor and cannot afford high fees for their children. Students also pointed out that they lack important facilities like computers and televisions in their schools. Therefore they are not kept abreast of the innovations, inventions and current issues important for academic work. This put them at a competitive disadvantage in relation to those students who use internet and other facilities to access information which is not available in text books.

Table 8 : t-test a n a l y s i s o f facilities in school

Parameters	Mean	SD	SE	t-ratio	P
Performance	30	1.85	.130		
Facilities	28	1.69	.119	-5.705	.000

Lack of facilities for teaching and learning is negatively affecting the academic performance of these schools as the results from Table 8 revealed that there exists a negative relationship between school facilities and academic performance of students in the selected secondary schools in Nyamira South District of Kenya. The results is in agreement with Hallak as cited in Owoeye and Yara (2011) as he posited that facilities form one of the potent factors that contribute to academic achievement in the school system. They include the school buildings, classroom, accommodation, libraries, laboratories, furniture, recreational equipment, apparatus and other instructional materials. The availability, relevance and adequacy of these facilities contribute to academic achievement. However,

unattractive school buildings and overcrowded classrooms among others contribute to poor academic attainment. These facilities should be located in appropriate places while the needs of the users should be put into consideration.

Conclusions

The results from this study had shown that the types of indiscipline in the schools selected for the study in Nyamira South District of Kenya are late coming, dodging of classes, escaping from school, disrespect to teachers and others like vandalism, immorality, bullying, drug abuse, noise making in that order. The results also revealed that there was a negative relationship between students' discipline and academic performance in Mathematics. These results are pointers to the fact that Mathematics is a disciplined subject and very useful in our everyday life and activities and as such students who dodge classes or come late to class may not learn much in a Mathematics class. To learn Mathematics, a lot attention should be paid to the subject as it is a methodological subject. To be able to understand the subject, a students' mind must be focused with rapt attention in order to understand the steps in solving a particular problem in Mathematics.

The results also revealed that secondary school teachers in Nyamira South district are qualified and perform their duties of teaching well as assessed by their students and school heads hence the relationship that exists between teachers' qualification and experience and academic performance. The schools in Nyamira South district were found to have limited facilities and this contributes to the poor academic performance. The schools with more facilities obtain better results than those with fewer facilities.

Recommendations

Based on the findings of this study, we therefore recommend that Government should provide more teaching learning facilities in schools to make the learning environment more attractive to students and teachers. The head teachers should liaise with the Teachers Service Commission (TSC) for posting of more teachers for mathematics. Those head teachers who have to employ forms four graduates should orientate them with the teaching of mathematics and at least they should complete one term, if not one year in the teaching before they terminate their services. Although the majority of the students tend to have to develop a dislike towards mathematics, teachers should use their professional experience in order to eradicate this attitude in that it tends to be the biggest problem mathematics teachers face. The importance of mathematics should be emphasized throughout the learning course. The teachers should keep on motivating their students in mathematics by making their lessons more interesting, incase they are not then the students will be bored by the students should try and improvise so as to avoid a lot of verbal explanations.

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