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SIRAJO, M & ABDULLAHI, Umar
Department of Science, State College of Basic and Remedial Studies, Sokoto - Nigeria
musa.surajo@scbrs.edu.ng

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AN ASSESSMENT OF CAUSES AND COPING STRATEGIES OF THE SHORTAGE OF MATHEMATICS TEACHERS IN SENIOR SECONDARY SCHOOLS IN SOKOTO METROPOLIS

SIRAJO, M & ABDULLAHI, U

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Abstract

This paper investigates the causes and coping strategies of the shortage of mathematics teachers in senior secondary schools in the Sokoto Metropolis. A descriptive survey design was adopted. Two research questions were answered in the study. The study's population consisted of 135 mathematics teachers from 35 public senior secondary schools in Sokoto, and the sample was representative of the population, therefore all the responses were used. The instrument used for collection of data consists of an 18-item adopted questionnaire titled "Teacher Shortage and Coping Strategies Questionnaire (TSCSQ)". The test-retest approach was used to pilot test the instrument, and it yielded a reliability coefficient index of 0.83. Based on the findings of the study, it was among other findings that over workload, high student enrolment, poor funding of education, and poor working conditions were the foremost causes of the shortage of mathematics teachers in senior secondary schools in Sokoto metropolis. It was then recommended that the government should train and employ more qualified mathematics teachers and provide well-ventilated classrooms with teaching aids and furnished staff rooms.

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Introduction

Mathematics is a discipline of science that studies numbers and how they are used. It involves calculations and solving problems. It is a systematic and logical subject. According to Kuku (2012), Mathematics is known as the cornerstone of science and technology, implying that the level of social and economic growth is inextricably linked to progress in the mathematical sciences. Azuka and Kurume (2015 p. 45) asserted that, "the production of technicians and technologists in any society depends on the level of the study of Mathematics in that society". The difference in the level of progress between advanced and developing countries was due to a disparity in mathematics teaching and learning in schools (Ukeja, 2002). Lucky (2017 p. 236) reveals that, "Mathematics is important to every individual

irrespective of culture, religion, tribe, social status, and gender, in a way that it merged along with daily life". Ambali (2012) opines that, Mathematical abilities are useful in a wide range of analytical, technological, scientific, security, political, and economic applications, and a strong foundation in mathematics prepares students for other academic and professional challenges. Mathematical tools aim in transforming a rural society to modern one.

Mathematics education is required to develop scientific understanding and the availability of current technology, both of which are required to boost economic production and viability (Jegede & Olojede, 2019). Mathematics education is supposed to be the foundation for higher learning. It's a tool for accelerating the country's economic, social, political, technical, scientific, and cultural development (Abdullahi & Sirajo, 2020). According to Dasko (2002), a teacher is someone who shares his or her knowledge with others, shows concern when needed, and displays the qualities of patience, kindness, and love. Osagie (2018) discloses that, Teachers are significant assets in the education of individuals of a society. They contribute to the development of a nation by sharpening and sculpting the character of students. Ukeja (2002), asserted that without excellent mathematics education and learning in schools, no civilization can progress. Adeyemi (2011) investigated teacher shortages and surpluses in Ondo State's senior secondary schools, and found that science disciplines, such as physics, chemistry, biology, and mathematics, had a high number of teacher shortages in both urban and rural schools. Also, Azuka and Kurume (2015) revealed that there were not enough qualified teachers in Nigerian schools. Sometimes they may use graduates from other fields to teach mathematics. National Mathematics Centre (NMC) in 2013 reported that the ratio of mathematics teachers to students was 1:350. This indicates a high shortage of mathematics teachers as students' population increases and low enrolment in teachers training.

According to Fadipe in Subair and Talabi (2015 p. 15) teacher shortages can be divided into four categories. These are the following:

(i) **Over Shortage:** This refers to the overabundance of teaching vacancies that must be filled. Such shortages consider both the level of specialization required and the quantity of quantities required, both of which are in limited supply.

(ii) **Hidden Shortage:** This includes teachers who instruct students in subjects in which they lack experience or knowledge. These teachers come within the category of underemployed teachers. These teachers work in areas where their qualifications do not fit.

(iii) **Suppressed Shortage:** This is when a subject is under-represented in the schedule due to a scarcity of qualified teachers.

(iv) **Modernized Shortage:** This refers to teachers who have completed their formal education but are already out of touch with latest advancements in their disciplines. Such teachers will benefit from a brief orientation provided via seminars, workshops, conferences, and other such events.

However, researchers disclosed some possible causes of the shortage of teachers. Leithwood, Louis, Anderson, and Wahlstrom (2004) reported that teachers have been burdened with an excessive workload in most schools due to a shortage of teachers in schools. Agreed with them are Smithers and Robinson (2003) who established that because of their excessive workload, teachers grow disconnected from teaching. Also, Adeogun (1999) found out that teachers who were disengaged from teaching in public schools did so because of low pay. Agreed with him are Smithers and Robinson (2003), who establish that the low pay of teachers is a major deterrent to entering the profession. Intersoll (2000) and Makinde (2010) identified high student enrolment as one of the serious causes of the shortage of teachers, Azuka and Kurume (2015) found out that the shortage of mathematics teachers is owing to poor working circumstances in the teaching profession, since many students opt for more profitable professional courses rather than studying mathematics and mathematics education.

According to Subair and Talabi (2015), any actions adopted by school administrators to maintain proper service delivery in the face of any issue, such as teacher shortages, interpersonal and intergroup relations, disciplinary difficulties, school-community crises, and the like, are referred to as coping strategies in schools. Coping strategies are the ways used by individuals, groups, organizations, institutions, or establishments to handle problems, even if it affects the scenario, crisis, or contingency management skills of heads, leaders, managers, or administrators under certain conditions following analysis (Subair & Talabi, 2015). Taiwo (1985) reveals that when there is a severe teacher shortage, school officials frequently appoint inexperienced interim teachers.

A teacher must develop coping and adjustment techniques. Teachers may experience negative emotional reactions and burnout if their ability to cope is insufficient. (Montgomery & Rupp 2005). Teachers who are having trouble dealing with their students' conduct adopt a variety of techniques to ignore it, including hiding the problem and pushing it away (without telling anybody), self-blame, stress and anxiety, the development of eating and sleeping disorders, or even falling ill. (Lewis, Romi, Qui, & Katz, 2005).

Objectives of the study

The following objectives have been proposed:

a) To identify the causes of shortage of Mathematics teachers in Senior Secondary Schools in Sokoto metropolis
b) Examine the coping strategies used for managing the shortage

Research Questions

The following research questions have led the study:

a) What are the causes of shortage of Mathematics teachers in Senior Secondary Schools in Sokoto Metropolis?
b) What are the coping strategies used in managing the shortage of Mathematics teachers in Senior Secondary Schools in Sokoto Metropolis?

Methods

This paper used a descriptive survey designed to seek information from the respondents. The study population contained 135 mathematics teachers from 35 public senior secondary schools within the Sokoto metropolis. The schools were under the supervision of the Ministry of Science and Technology, Sokoto Teachers Service Board, and the Arabic and Islamic Education Board, Sokoto. Hence, all the respondents involved in the study were used as suggested by Moore (1994). The instrument used for collection of data consists of an 18-item adopted questionnaire by Subair and Talabi (2015), titled Questionnaire on Teacher Shortage and Coping Strategies (TSCSQ). The test-retest approach was used to pilot-test the instrument, yielding a reliability coefficient index of 0.83. The collected data collected was analyzed using frequency counts and simple percentages.

Results

The age distribution of the subjects revealed that 84% were in the age group from 20 years to 40 years, while 16% were from 41 years to 60 years of age. Gender distribution indicated that 76% of the math teachers were male and 24% were female. According to the educational qualifications of the subjects, 64 percent had a first degree, 23 percent had an N.C.E, 5% had an H.N.D, 4% had a master's degree, and 5% were student teachers undertaking their teaching practice during the research time.

Research Question One: What are the causes of shortage of Mathematics teachers in Senior Secondary Schools of Sokoto Metropolis?

Table 1. Causes of Shortage of the Mathematics Teachers in Sokoto Metropolis (N = 135)

	Items	SA	A	SD	D
a)	Over workload	43(32%)	71(53%)	7(5%)	14(10%)
b)	Poor Working Condition	35(26%)	72(53%)	10(8%)	14(10%)
c)	High students' enrolment	30(22%)	72(53%)	12(9%)	21(16%)
d)	Poor funding of education	37(28%)	65(48%)	15(11%)	18(13%)
e)	Poor teacher's salary	50(37%)	35(26%)	14(10%)	36(27%)
f)	Job dissatisfaction	22(16%)	59(44%)	11(8%)	43(32%)
g)	Retirement	12(9%)	59(44%)	23(17%)	41(30%)

Source: Field work, 2020

Table 1 shows that 114 (85 %) of respondents agree that workload is the primary cause of the scarcity of mathematics teachers, while 21 (16 %) disagree. 107 (79%) of the respondents agree that poor working conditions were the second reason for the shortage of mathematics teachers, while 28 (21%) disagree. Also, 102 (76%) of the respondents agree that high student enrolment and poor funding of education are the third and fourth reasons for the shortage of mathematics teachers, while 33 (24% disagree. The study also reveals that 85 (63%) of the respondents agree that poor teachers' salaries are another cause of the shortage of mathematics teachers, while 50 (37%) disagree. Again, 81

(60%) of the respondents agree that job dissatisfaction is another cause of the shortage of mathematics teachers, while 54 (40%) disagree. Furthermore, 71 (53%) of the respondents agree that retirement is another cause of the shortage of mathematics teachers, while 64 (47%) of the respondents disagree. Therefore, overwork was the major cause of the shortage of mathematics teachers in public senior secondary schools in the Sokoto Metropolis.

Research Question Two: What are the coping strategies used for managing the shortage of Mathematics teachers in Senior Secondary Schools of Sokoto metropolis?

Table 2: Coping Strategies Used to Managing the Shortage of Mathematics Teachers (N = 135)

	Items	SA	A	SD	D
a)	Merge classes	30(22%)	76(56%)	13(10%)	16(12%)
b)	Make use of student teachers/NYSC	32(24%)	74(55%)	12(9%)	17(12%)
c)	Over loading the existing staff	47(35%)	46(34%)	15(11%)	27(20%)
d)	School administrators help out sometimes	21(16%)	67(50%)	14(10%)	33(24%)
e)	Adjustment of the scheme of work	15(11%)	69(51%)	19(14%)	32(24%)
f)	Reduction of the number of periods	18(13%)	61(45%)	26(20%)	30(22%)
g)	Assign roles to unqualified staff	20(15%)	57(42%)	27(20%)	31(23%)

Source: Field work, 2020

Table 2 shows the coping strategies used by mathematics teachers in public senior secondary schools. It reveals that 106 (78%) of the respondents agree that merging classes or making use of student teachers/NYSC were the coping strategies, while 29 (22%) disagree. Also, 93 (69%) respondents agree that over-loading the existing staff is another coping strategy, while 42 (31%) disagree. Furthermore, the study reveals that 88 (66%) of the respondents agree that school administrators help sometimes, while 47 percent disagree. 84 (62%) of the respondents agree that adjustment of the scheme of work as a coping strategy, while 51 (38%) disagree. Again, 79 (59%) of the respondents agree on the reduction of the number of periods, while 56 (41%) disagree, and 77 (57%) of the respondents agree on the assigned roles to unqualified staff as a coping strategy, while 58 (43%) disagree. Therefore, increasing class size or making use of student teachers/NYSC were the coping strategies commonly used to manage the mathematics teachers' shortage in public senior secondary schools in the Sokoto Metropolis.

Discussion of Findings

It was found out in this study that over-workload was the major cause of the shortage of mathematics teachers in the senior secondary schools of the Sokoto Metropolis. Supporting this finding, Leithwood *et al.* (2004) reported that teachers have been burdened with an excessive workload in most schools due to a scarcity of teachers in schools. Also, Smithers and Robinson (2003) agreed that excessive workload on teachers makes some of them disengage from the teaching profession. The result shows that high students' enrolment is another cause of the shortage of mathematics teachers. This validates the findings made by Intersoll (2000) and Makinde (2010), who highlighted one of the major causes of teacher shortages as increased student enrolment.

This study also indicates that poor funding of education and poor working conditions were other causes of the shortage of mathematics teachers. The result is in consonance with that of Azuka and Kurume (2015), who found out that the shortage of mathematics teachers is owing to the poor working circumstances of the teaching profession, since many students opt for more profitable professional courses rather than mathematics and mathematics education. The result also shows that poor teachers' salaries are another cause of the shortage of mathematics teachers. Supporting this finding, Adeogun (1999) found out that teachers were disengaged from teaching in public schools because of low pay. Also, agreeing with this finding are Smithers and Robinson (2003), who establish that the low pay of teachers is a major obstacle to admission into the profession. Additional findings of the study are that job dissatisfaction and retirement were causes of the shortage of mathematics teachers. Adeogun (1999) and Adeyemi (2011) agreed that the scarcity will continue because of teacher retirements without adequate replacements.

In terms of the coping strategies used to manage the shortage of mathematics teachers, the study reveals that an increase in class size, making use of student teachers or NYSC, overloading of existing staff, assigning roles to staff members who are unqualified, and school administrators sometimes helping were common occurrences. These findings agree with those of Taiwo (1985) and Ingersoll (2000) suggest that in order to alleviate the effects of a teacher shortage, school administrators hire temporary teachers who aren't properly trained and end up overburdening the rest of the workforce with tasks and duties. Adeyemi (2011) also supported the study and remarked that to address the

issue of teacher shortages, school administrators rely on redistribution of work from unfilled positions among the teaching staff, often to teachers with no prior experience in the topic.

Conclusion

The findings of the study reveal that there was a shortage of mathematics teachers in senior secondary schools in the Sokoto Metropolis. The finding also reveals that over workload, high student enrolment, and poor working conditions were the major causes of the shortage of mathematics teachers. It also found out that an increase in class size, making use of temporary teachers, and overloading the existing staff were the coping strategies used to manage the shortage of mathematics teachers in senior secondary schools in Sokoto metropolis.

Recommendations

The following recommendations were made based on the research findings:

1. The Government should train and employ more qualified mathematics teachers, as well as provide scholarships to young and vibrant students interested in studying mathematical science education.

2. The Government should improve working conditions by providing well-ventilated classrooms with teaching aids, mathematical laboratories, and furnished staff rooms. These may encourage people to take up the teaching profession.

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