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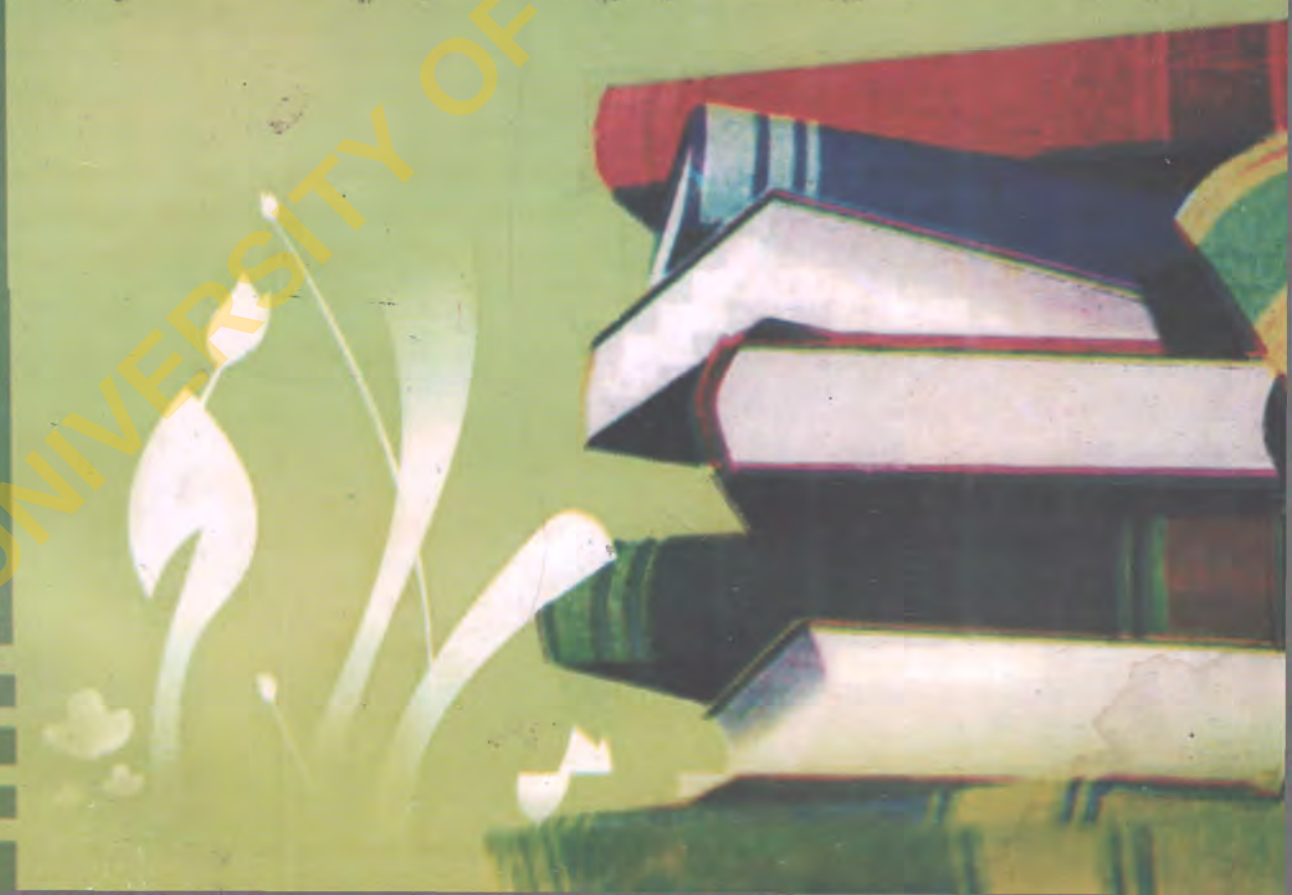

Contents

Workload and Professional Competence as a Correlate of Mathematics Teachers' Teaching Effectiveness in Secondary Schools in Osun State, Nigeria

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Abstract

This study is hinged on the balancing of the workload and professional competence of mathematics teachers in secondary schools in Osun State, Nigeria which was premised on cognitive load theory. The study adopted the descriptive survey design. One hundred and nineteen mathematics teachers were randomly selected from both public and private secondary schools in 10 local government areas of Osun State. Instruments used were Workload Scale (r=0.78), Professional Competence Scale (r=0.83) and Teaching Effectiveness Scale (r=0.87). Data were analysed using descriptive statistics of frequency count, percentage, mean, while Pearson product moment correlation, t-test and Analysis of variance were used for analyzing the data at 0.05 level of significance. Professional competence (r=0.39) and workload (r=0.26) had positive significant relationship with mathematics teachers' teaching effectiveness. Mathematics teachers' teaching effectiveness in terms of methodology, curriculum and textbook usage, knowledge of their students, context and self were high as against the threshold of 3.0 as the criterion point. Among other things, it was recommended that there should be re-evaluation of the professional training of Mathematics teachers regardless of where they work.

Keywords: Teaching effectiveness, Workload of mathematics teachers, Teachers' professional competence, Secondary Schools in Osun State

Introduction

The importance of mathematics in the development of manpower for a nation's economy cannot be overemphasized in any nation of the world. The Federal Republic of Nigeria has clearly demonstrated this by making mathematics a core and compulsory subject at both the junior and senior levels of secondary school (Federal Republic of Nigeria, 2013). Mathematics, as it is widely understood, plays a key role in shaping how individuals deal with the various spheres of private, social, and civil life. Yet today, as in the past, many students struggle with mathematics and become disaffected as they continually confront obstacle to engagement. In Nigeria today, serious concern has been expressed by parents, teachers, employers of labour and the entire society about the performance of students in the Senior Secondary School Certificate Examination (SSCE) especially Mathematics. Several reasons have been suggested by researchers for the poor quality of performances (Adesoji and Owoyemi 2012). In order to break this pattern, it is therefore imperative, that we understand what effective mathematics teaching looks like.

Effective mathematics teaching is important because it promotes student learning. It has become even more important as emphasis on improving students' performance in mathematics teaching in secondary education has increased. Most studies tend to emphasize mathematics teachers' qualities such as knowledge and organization of the subject matter, skills in instruction and personal qualities and attitude that are useful when working with students (Cashin, 1995). When personal qualities are emphasized, effective mathematics instructors are described as enthusiastic, energetic, approachable, open, imaginative and possessing a high sense of humor. When teaching skills and mastery of subject matter are emphasized, effective mathematics instructors are described as being masters of the subject matter, organized and emphasized important concepts, able to clarify ideas and point out relationships, able to motivate students among others. No wonder Sikora (1997) said that there is no scientific method of separating what and how much a pupil learned from the teacher, due to all other extraneous list of traits attributed to the teacher.

However, the management of mathematics teacher's workload in school is an important aspect that can make or mar the pedagogic goals of education. Nkwekw and Dollah (2011) define a mathematics teacher's workload as the totality of academic teaching work and group workload assigned to a teacher for the attainment of the overall educational objectives in the school. This is in terms of lesson notes preparation, test and assignments,

examination, class work markings and corrections, and other routine works that may be assigned to a mathematics teacher by the principal. A Mathematics teacher therefore can be overloaded, that is, much task in terms of teaching units and committee assignment or under-loaded with work, that is, less teaching unit assigned (Zwalchir and Buenyen, 2009).

Mathematics teacher should possess the right qualifications and professional knowledge required. The question, therefore is, "What qualifications are necessary for a mathematics teacher to be effective in his/her work?" Mathematics teacher's experience is of primary importance, as they have the experience gained from actual practice and are therefore in a position to evaluate their needs in terms of the qualifications that can facilitate their work and guarantee their effectiveness. The term that has been used over the past few years to describe the mathematics teachers' qualifications is "competence". Competence presupposes the individual qualities and attitudes of teachers, as well as their skills and knowledge that arise as a result of their work. In this study, the qualifications considered essential for mathematics professionals to be effective in pedagogical and didactic works are put together. The following questions were often asked: a) What qualities, attitudes, skills and knowledge contribute to a mathematics teacher's effectiveness? b) Do mathematics teachers use their pedagogical knowledge and skills in order to improve their pedagogic and didactic work?

According to Brophy (2001), teacher effectiveness deals with characteristics of teachers while teaching effectiveness concerns the teaching process. Mathematics teaching is a complex endeavour, involving classroom management, lesson preparation and organisation of teaching and learning activities, creating and maintaining a conducive climate, evaluation and feedback. Broadly speaking there is no consensus on what constitutes good mathematics teaching. Brophy distinguishes 12 principles of effective mathematics teaching, which are:

Supportive classroom climate: Mathematics students learn best within cohesive and caring learning communities. The role of the teacher as model and socializer is emphasised in this context.

Opportunity to learn: Students of mathematics learn more when most of the available time is allocated to curriculum-related activities and the classroom management system emphasizes students' engagement in those activities.

Curricular alignment: All components of the curriculum are aligned to create a cohesive programme for accomplishing mathematics instructional purposes and goals.

*Establishing learning orientations: Mathematics t*eachers prepare students for learning by providing an initial structure to clarify intended outcomes and cue desired learning strategies, for *example* providing advance organisers and cuing the kind of responses that are expected.

Coherent content: To facilitate meaningful mathematics learning and retention, content is explained clearly and developed with an emphasis on its structure and connections. When making mathematics presentations, providing explanations or giving demonstrations, effective teachers project enthusiasm for the content, organise and sequence it so as to maximize its clarity and "learner friendliness".

Thoughtful discourse: Questions are planned to engage mathematics students in sustained discourse structured around powerful ideas.

Practice and application activities: Mathematics students need sufficient opportunities to practice and apply what they are learning and to receive improvement-oriented feedback.

Scaffolding students' task engagement: Mathematics teacher provides whatever assistance students need to enable them to engage in mathematics learning activities productively. Structuring and support can be lessened as the students' expertise develops.

Strategy teaching: Teacher of mathematics models and instructs students in learning and self-regulation strategies. Meta-cognitive awareness and self-regulation are sought in contexts like problem solving, general learning and study skills. Students are stimulated to monitor and reflect on their learning.

Co-operative learning: Mathematics students often benefit from working in pair or small group to build understanding or help one another master skills.

*Goal-oriented assessment: T*eacher uses a variety of formal and informal assessment methods to monitor progress towards learning goals. Comprehensive mathematics assessment also examines students' reasoning and problem-solving processes.

Achievement expectations: Mathematics teacher establishes and follows through on appropriate expectations for learning outcomes.

Research has validated the widespread belief that effective mathematics teaching matters,

but what does effective mathematics teaching look like? And how can it be measured? There are a variety of methods for measuring mathematics teaching effectiveness. Some examine teachers' practices directly, whereas others emphasize student outcomes. Each method involves trade-offs, and no single method provides a complete picture of a mathematics teacher's effectiveness.

Standardized mathematics tests provide an efficient way to measure how well students have learned basic content. For reading, mathematics teaching effectiveness can usually be estimated from standardized test scores using complex statistical methods, such as value-added modeling or student growth percentiles. When standardized test scores are not available, other approaches can be used, such as student learning objectives (which assess mathematics teacher's performance on the basis of specific student learning targets) or analysis of student work samples.

The most commonly used method of measuring mathematics teaching practice is classroom observation. The observations can be done by principals, other teachers, or external evaluators, either in person or via video. Lesson plans and assignments can also be analyzed to learn more about a teacher's practices. All of these activities usually require more time and money than test-based estimates of mathematics teaching effectiveness.

Workload in its narrowest definition according to Easthope and Easthope (2000) is the number of classes, numbers of student teachers teach and the different activities that teachers perform. Workload is the measure of the amount and types of work performed by an individual within a given period of time. It is both a quantitative measure of the total work performed and a qualitative measure of the person's perception of his/her ability to perform the work" (Business Dictionary, n.d.). There is evidence from different contexts around the world that mathematics teachers find their work stressful and that workload may be a cause. In Hong Kong, for example, a report submitted by the Committee on Teachers' Work (2006) found that "mathematics teachers' stress usually comes from a variety of sources, including heavy workload" Manthei and Gilmore (1996). Pithers and Soden (1998) found a general increase in stress level and a decrease in teaching effectiveness after a four years long study of mathematics teachers' stress in New Zealand. In addition, Pennington (1995) notes that "job satisfaction is seen as a global outcome which is related to a variety of attributes of individual employees and their job situations, such as their age, personality, roles and responsibilities, and working conditions". Other studies have looked at the reasons behind increased workloads for mathematics teachers; Easthope & Easthope (2000), for example, identified four reasons for such increase: student assessment, less money spent on education, administrative structures and an increased student population.

Since the 1920s, the issue of mathematics teachers' qualifications, which can guarantee their effectiveness, has been of concern for not only the science of pedagogy, but also for those in charge of staffing schools with qualified mathematics professionals. As regards this issue, recent studies by Whitty (1996) revealed that the way in which a teacher carries out his/her work is determined by the union of his/her personality traits and acquired knowledge. A "good mathematics teacher" should possess a wide range of qualifications which could, schematically, be classified as follows:

Personality traits, attitudes and beliefs: These include personality traits related to the professional role of a mathematics teacher, which can be nurtured and developed through initial education and continuous training. Specifically, Whitty (1996) in his studies have shown that traits such as flexibility in terms of the appearance of students, a sense of humour, a sense of fairness, patience, enthusiasm, creativity, care and interest in the students, all contribute to the effectiveness of a mathematics teacher (Malikow 2005, Harslett 2000). Also, mathematics teacher's attitudes and beliefs on teaching and learning, his/her roles, all of which affect the way he/she chooses, evaluates and comprehends the knowledge acquired, as well as the way he/she benefits from the knowledge in practice, as this practice is shaped by that knowledge (Feiman-Nemser 1990, Schön 1983, Zeichner and Liston 1996). The attitudes of mathematics teachers affect their degree of commitment to their duties, the way they teach and treat their students, as well as how they perceive their professional growth (Chen and Rovegno 2000, Darling-Hammond 2000). Specifically, mathematics teachers that have high expectations for their students and insist on promoting learning for all students tend to be more effective (Malikow 2005, McBer 2000). Another factor which contributes to the effectiveness of mathematics teachers is a feeling of commitment to the job at hand (Coladarsi 2002) and interest in the personal life of their students and their families

(Harslett 2000). Lastly, "knowledge of self" and contemplation are worth mentioning, in that they presuppose critical and careful reflection, on the part of the teacher, on his/her actions and self (Turner-Bisset, 2001). McBer (2000), from a series of interviews with mathematics teachers, identified 16 "professional characteristics", including personality traits and individual attitudes, which she then classified into five groups: a) Professionalism: commitment, confidence, trustworthiness, respect;. b) Thinking: analytic and conceptual thinking; c) Expectations: disposal of achievement of high objectives, disposal for permanent comprehension of reality (example: the students, the order), and undertaking of initiatives; d) Leadership: flexibility, accountability, passion for learning; e) Relations with other: fertile interaction which involves the educational process, skills of common work and comprehension.

Pedagogical Skills and Knowledge: Didactic and pedagogical skills are not only understood as familiarisation with techniques that are used mechanically, but also as the acquisition of routines which, without a doubt, every mathematics teacher needs in order to save time and energy for the more significant aspects of his/her work; at the same time, they refer to a set of theoretical principles and research data that lead to a variety of techniques and strategies which a teacher chooses and shapes, depending on the circumstances.

A plethora of related studies shows specific actions by mathematics teachers which can be considered factors for their effectiveness. With regard to teaching approach, it seems that effective mathematics teachers (McBer 2000, Jasman 2002, Anderson 2004): set realistic objectives, try and give incentives to students for learning, apply various teaching methods, select participative forms of teaching, test and create didactic materials, present information in a clear manner, combine words with pictures, use various teaching aids, maximise teaching time through systematic measures (examples include: planning and reducing disturbances in the classroom), assign work that will stir the interests of the students, monitor and evaluate the progress of students, set evaluation criteria for students and inform the students about them, and provide feedback to the students. Another decisive factor in effectiveness is a mathematics teacher's ability to recognise the diversity of students, to choose the best method possible for each student, and to create incentives for students (Harslett, 2000).

Another important factor is teachers' cooperation not only with the students, but also with the parents of the students, their colleagues and the community at large (Jasman 2002). Lastly, effectiveness, to a great extent, depends on the way problems in the classroom are managed. Research shows that effective mathematics teachers keep all happenings in the classroom in check, they are constantly on alert, they swiftly deal with any problem that may arise and they adopt various ways of working with students (Everston, Wang and Randolph, 1999).

A basic qualification, whatever the case, is the acquisition of an extended body of knowledge which contributes to the way mathematics teacher performs in practice (Birman 2000, Hawley and Valli 1999). Generally, a teacher's training is classified into three fields: subject knowledge, pedagogical and didactic studies, and teaching practice. However, what still needs to be defined is what should be taught in these educational fields, especially in pedagogical studies. A way to define the contents of "professional knowledge" is to provide answers to the following questions: "What makes up the pedagogical and didactic work of a teacher?" and "What knowledge type and qualifications are needed for a teacher to cope?" According to Shulman (1987), pedagogical thought and action go through the following stages: a) understanding/perception; b) modification/ transformation; c) teaching; d) evaluation; e) feedback; f) reflection. For a mathematics teacher to cope with the above, "professional studies" are required, that is: a) pedagogical content knowledge and b) curriculum studies (Shulman 1986, Shulman 1987). Turner-Bisset suggests a course that would instill the necessary qualifications and focus on the following fields (Turner-Bisset 1999, Turner-Bisset 2001): "substantive knowledge", "syntactic knowledge", beliefs about the subject, knowledge of curriculum, knowledge of contexts, knowledge of self, didactic training, knowledge of learners, knowledge of objectives and learning outcomes, general pedagogical knowledge, pedagogical-didactic amalgam and learning subject. This body of knowledge, that can guarantee a teacher's expertise, is determined by existing conditions and contexts, as well as the personal experiences, beliefs and needs of each teacher, a fact that renders an *a priori* definition of this knowledge extremely difficult. Nevertheless, there are knowledge fields that constitute a necessary prerequisite for every teacher, or at least for a large part of them (Meijer, Verloop, Beijaard 1999 and 2001), and which form the basic part of "professional knowledge".

Mathematics teacher's effectiveness is not only the sum of his/her knowledge, but rather the link between the different types of knowledge he/she possesses. These types of knowledge do not simply coexist: they should form a complete, inseparable unit of knowledge (Kennedy 1990). The degree of connectivity between these separate types of knowledge sets apart a "competent" teacher from an "excellent" one, as a "competent" teacher manages to combine these knowledge forms in part, whereas an "excellent" teacher uses the knowledge deriving from each separate field most effectively (Turner-Bisset 2001).

Statement of the Problem

Mathematics teacher's professional competency and workload is on the front burner when it has to do with quality or effectiveness of mathematics teaching in determining to a great extent the level of quality achievement in mathematics. On a general perception, there is public outcry on the deteriorating level of quality of education as products of our education system, secondary school inclusive cannot adequately prove their worth at higher levels and employment industries. The scenario is worsening with the incompetency of some mathematics teachers in schools with the resulting high workload. The study therefore, was carried out to investigate workload and professional competence of mathematics teachers teaching effectiveness in Osun State, Nigeria.

Hypotheses

The following hypotheses were tested at 0.05 level of significance.

Ho1: There is no significant relationship between mathematics teachers' professional competence and teaching effectiveness.

Ho2: There is no significant relationship between mathematics teachers' workload and teaching effectiveness.

Methodology

The descriptive survey design was deemed most appropriate for the study since the researcher has no direct control over the variables as their manifestations have already existed.

Sample and sampling technique

The population for this study consists of secondary school mathematics teachers in 10 local government areas of Osun State. Twelve mathematics teachers per local government area, making 120 mathematics teachers were randomly selected for the study.

Research instruments

Self-constructed and standardized structured questionnaire were the main instruments used for collecting data. The instrument was divided into four sections. Section A presents the demographic data of the respondents and was made up of eight items. Section B-D presents subsections of the instrument namely:

i. Workload Scale (WS): Four sub-scales were developed totalling 32 items which arise from: school administration, teaching, resources and student assessment. Two-point Likert scale (Yes/No) was used to rate school administration while four-point likert scale (strongly agree, agree, disagree and strongly disagree) was used to rate teachers.

ii. Professional Competence Scale (PCS): Four sub-scales were developed totaling 28 items which arise from: attitude, skills, qualities and knowledge. A four-point Likert scale (strongly agree, agree, disagree and strongly disagree) was used to calibrate the scale.

iii. Teaching Effectiveness Scale (TES): Five sub-scales were developed totaling 16 items which are: teaching methodology, curriculum and syllabus, knowledge of learners, knowledge of contexts and knowledge of self. A five-point Likert scale (very rarely, rarely, occasionally, frequently and very frequently) was used to calibrate the scale.

The reliability of the instrument was established using the Cronbach's Alpha measure of internal consistency of 0.7. The reliability co-efficient for the remaining sections of the instrument were: the workload scale (r=0.78), professional competence scale (r=0.83) and teaching effectiveness scale (r=0.87)

Method of data analysis

Data collected were analysed using frequency count, percentage and mean to describe the respondents' characteristics while correlation coefficient, t-test and One-way analysis of variance were used for analyzing quantitative data at 0.05 level of significance.

Results

Research Question: What is the level of secondary school Mathematics teachers teaching effectiveness?

Table 1a: showing mathematics teacher's level of teaching effectiveness (teaching methodology)

ITEM	*STATEMENT*	*VR*	*R*	*O*	*F*	*VF*	*X*	*SD*
1	Organizing activities outside the classroom	4 (3.4)	17 (14.3)	41 (34.5)	32 (26.9)	25 (21.0)	2.52	1.08
2	Using of new technology	18 (15.1)	40 (33.6)	17 (14.3)	22 (18.5)	22 (18.5)	3.08	1.37
3	Giving descriptive assessment	16 (13.4)	46 (38.7)	28 (23.5)	14 (11.8)	15 (12.6)	3.29	1.22

4	Allowing students to speak	51 (42.9)	45 (37.8)	12 (10.1)	5 (4.2)	6 (5.0)	4.09	1.07
5	Opting for group teaching	15 (12.6)	25 (21.0)	49 (41.2)	17 (14.3)	13 (10.9)	3.10	1.14
6	Using the project method	12 (10.1)	15 (12.6)	43 (36.1)	26 (21.8)	23 (19.3)	2.72	1.21
	Weighted Mean =						**3.13**	

Note: Figures in bracket indicate percentages

Table shows mathematics teacher's level of teaching effectiveness in the area of teaching methodology; the Weighted Mean is greater than the Average Mean Value (3.13>3.00), this shows that Mathematics teachers use adequate teaching methodology to bring about teaching effectiveness.

Table 1b: showing mathematics teacher's level of teaching effectiveness (curriculum and school textbooks)

ITEM	*STATEMENT*	*VR*	*R*	*O*	*F*	*VF*	*X*	*SD*
1	Adding to basic content with new information	19 (16.0)	38 (31.9)	34 (28.6)	24 (20.2)	4 (3.4)	3.37	1.08
2	Using extra material	18 (15.1)	38 (31.9)	32 (26.9)	18 (15.1)	13 (10.9)	3.25	1.21
3	Incorporating contemporary issues into lesson	12 (10.1)	33 (27.7)	34 (28.6)	23 (19.3)	17 (14.3)	3.00	1.21
	Weighted Mean =						**3.21**	

Note: Figures in bracket indicate percentages

From table 1b, the Weighted Mean is greater than the Average Mean Value (3.21>3.00), this shows that Mathematics teachers use relevant curriculum and textbook to bring about teaching effectiveness in their work.

Table 1c: showing mathematics teacher's level of teaching effectiveness (knowledge of learners)

ITEM	*STATEMENT*	*VR*	*R*	*O*	*F*	*VF*	*X*	*SD*
1	Allowing students to speak in the class	54 (45.4)	43 (36.1)	15 (12.6)	4 (3.4)	3 (2.5)	4.18	0.96
2	Discussing classroom problems with students	26 (21.8)	38 (31.9)	23 (19.3)	18 (15.1)	14 (11.8)	3.37	1.30
3	Discussing student's performance with students	20 (16.8)	42 (35.3)	29 (24.4)	10 (8.4)	18 (15.1)	3.30	1.28
4	Discussing the personal problems of students with students	10 (8.4)	24 (20.2)	18 (15.1)	24 (20.2)	43 (36.1)	2.45	1.38
	Weighted Mean =						**3.33**	

Note: Figures in bracket indicate percentages

From table 1c, the Weighted Mean is greater than the Average Mean Value (3.33>3.00), this shows that Mathematics teachers have greater knowledge of their learners which bring about teaching effectiveness in their work.

Table 1d: showing mathematics teacher's level of teaching effectiveness (knowledge of contexts)

ITEM	*STATEMENT*	*VR*	*R*	*O*	*F*	*VF*	*X*	*SD*
1.	Cooperating with colleagues	41 (34.5)	41 (34.5)	18 (15.1)	11 (9.2)	8 (6.7)	3.81	1.20
2.	Involving parents in the learning process	22 (18.5)	37 (31.1)	33 (27.7)	15 (12.6)	12 (10.1)	3.35	1.21
	Weighted Mean =						**3.58**	

Note: Figures in bracket indicate percentages

From table 1d, the Weighted Mean is greater than the Average Mean Value (3.58>3.00), this shows that Mathematics teachers have adequate knowledge of their classroom situations which brings about their teaching effectiveness.

Table 1e: showing mathematics teacher's level of teaching effectiveness (knowledge of self)

ITEM	*STATEMENT*	*VR*	*R*	*O*	*F*	*VF*	*X*	*SD*
1.	Doing a self-assessment	32 (26.9)	49 (41.2)	13 (10.9)	17 (14.3)	8 (6.7)	3.67	1.21
	Weighted Mean =						**3.67**	

Note: Figures in bracket indicate percentages

Table 1e shows Mathematics teachers' level of teaching effectiveness in self-assessment (Mean=3.67), since the Weighted Mean is greater than the Average Mean Value (3.67>3.00), this shows that Mathematics teachers assess themselves periodically which helps them to teaching effectively.

Testing of hypotheses

Ho1: There is no significant relationship between mathematics teacher's professional competence and teaching effectiveness.

Table 2: Pearson Correlation Coefficient showing the relationship between mathematics teacher teaching effectiveness and professional competence

VARIABLES	N	X	SD	df	r	Sig
Teaching effectiveness	119	52.496	10.740			
Professional competence	119	88.017	8.689	117	0.387*	0.000

* denotes significance at 0.05 level

Table 2 described the relationship between teaching effectiveness and professional competence of mathematics teachers and it shows that mean of 88.017 and a standard deviation of 8.689 for professional competence and the corresponding mean score of teaching effectiveness 52.496 with a standard deviation of 10.740. The correlation of 0.387 was found to have a positive and significant relationship. Hence, the null hypothesis is rejected, which depicted that there was significant relationship between teaching effectiveness and professional competence of secondary school mathematics teachers.

Ho2: There is no significant relationship between mathematics teacher's workload and teaching effectiveness.

Table 3: Pearson Correlation Coefficient showing the relationship between mathematics teachers' teaching effectiveness and teacher's workload

VARIABLES	N	X	SD	df	R	Sig
Teaching effectiveness	119	52.496	10.740			
Workload	119	85.924	7.249	117	0.262*	0.004

* denotes significance at 0.05 level

Table 3 described the relationship between teaching effectiveness and mathematics teachers' workload and it shows that the mean of workload is 85.924 and a standard deviation of 7.249 with its corresponding mean score of teaching effectiveness 52.496 and a standard deviation of 10.740. The relationship was positive and significant. Hence, the null hypothesis is rejected, which depicts that there was significant relationship between teaching effectiveness and workload of secondary school mathematics teachers.

Discussion of findings

The study found out that there was significant relationship between professional competence and teaching effectiveness of secondary school mathematics teachers in Osun State. Contrary to Akiri (2008) who concluded that there was no significant relationship between professional competence and teaching effectiveness. The finding agrees with Malikow (2005), Harslett (2000) that traits such as flexibility in terms of the appearance of students, a sense of humour, a sense of fairness, patience, enthusiasm, creativity, care and interest in the students, all contribute to the effectiveness of teachers. The findings, therefore, suggest that knowledge of self and contemplation are worth mentioning, in that they presuppose critical and careful reflection, on the part of the teacher, on his/her actions and self and that additional professional qualification beyond first degree do not necessarily lead to improved

competence of teaching at secondary school level. It is therefore not surprising that Ravkin (2005) had concluded that there was no evidence that a master's degree raises teacher effectiveness at secondary school level.

The study also found that there was significant relationship between workload and teaching effectiveness of secondary school mathematics teachers. The finding agrees with Osagie and Okafor (2012) who concluded that teachers' workload was one of the factors that inhibited teaching effectiveness. The findings point to the negative impact of increased workload for teachers on the teaching – learning process. Easthope and Easthope (2000), for example, found that student assessment, less money spent on education, poor administrative structures and an increased student population all contributed to ineffective mathematics teaching. The findings therefore, suggest the need for extra classroom assistants and other support staff that would take up the non-teaching tasks, allowing teachers to prepare for lessons which might reduce their workloads.

Conclusion

Mathematics teacher's excess workload constitute adverse effect to their teaching effectiveness, hence government and educational administrators should relieve them of excess work and employ more mathematics teachers. From the findings, it can also be concluded that mathematics teachers are exposed to classrooms full of students, have to play the roles of classroom teachers, examiners, administrators, counsellors and they have to ensure that students achieve and perform well in Mathematics.

Recommendations

The government, through the Ministry of Education, should urgently employ more mathematics teachers in order to ease mathematics teachers' weekly and daily workload for adequate content coverage, as it is a subject offered by all students at secondary school level to avoid overloading the teachers. They should also make provision in the condition of service for excess workload in public schools. There should be configuration of a framework for the evaluation, and self-evaluation, of the professional training of mathematics teachers. This study contributed to mathematics teachers' understanding of themselves, regardless of the context in which they work, because basic qualifications that contribute to their effectiveness were spelled out. Taking into consideration mathematics teachers' specific needs should be a welcomed development. The findings could, therefore, be used for a more effective planning of in-service training programme on pedagogical issues.

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