TEACHERS' EFFECTIVENESS AND PRE-SERVICE TEACHERS SATISFACTION IN LEARNING PRIMARYMATHEMATICS

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Abstract
This study investigated Analysis of teacher effectiveness and pre service teacher's satisfaction in learning Mathematics in Owerri municipal council of Imo- State. Based on the objectives of the study three hypotheses were formulated and tested at 0.05 level of significant. Descriptive survey research design was adopted in carrying out the study. The population of the study involved all 1,014 pre service teachers in school of early childhood care and primary education. A sample of 350 pre-service teachers was selected through a simple sampling procedure. The instruments used for data collection were Teacher Effectiveness Inventory (TEI) and Mathematics Satisfaction Questionnaire (MSQ). The validity of the instruments was determined by two experts in mathematics education and three experts in measurement and Evaluation. The reliability of the instruments was determined using test retest method which yielded reliability coefficients of 0.93 and 0.87 respectively. Data collected were analyzed using multipleregression analysis. The results revealed that out of the six variables, the five variables contribute significantly to pre service teacher'ssatisfaction in learning Mathematics. Therefore, it was recommended that teachers should be made to improve the skills involved in all the independent variables involved in this

study through regular seminars, workshops, teachers retraining and in-service programmes.

Keywords: Teacher Effectiveness, Satisfaction and Primary Mathematics

Introduction

The knowledge of mathematics is paramount in the success of learners in his numerous day to day activities in life. Mathematics education holds the potency of making learners to relate mathematics knowledge to everyday problem being encountered and hence develop the individuals to a level that they are intellectually and economically stable. Right from the pre-historic days of the early human societies to the present "hitec" age, mathematics has played a fundamental role in the economic development of many countries of the world (Popoola in Unamba, Nwaneri& Ike, 2019).In every country, regardless of the level of economic, scientific and technological development, mathematics has to be taught to a number of scientists, technical specialists, scientific researchers etc. The service of these professionals will be continuously required for the well-being of the students and for the development of the society. Nigeria as a country needs to strive for scientific and technological breakthrough in order to cater for her domestic and international needs to enable her assert her greatness among the United Nations member states. The pertinent virtue of mathematics as well as its contributions to the development of mankind has earned the subject the prominence it enjoys amongother school subjects. The importance accorded to mathematics in the school curriculum from primary to secondary levels reflects accurately the vital role played by the subject in contemporary society. It is a core subject in the primary and secondary school certificate curriculum. Also, a credit pass in mathematics at the senior secondary school certificate examination is needed as a pre-requisite for admission into the tertiary institutions in Nigeria. It is in realization of this that many countries resort to making especially comprehensive and well-programmed efforts towards the effective teaching and learning of mathematics at all levels of their educational system through the development and implementation of innovative programmes and projects (Azuka, 2013).

Akinmola (2014) opined that mathematics is an excellent vehicle for the development of person's intellectual competence in logical reasoning, spatial visualization, analysis and abstract thinking. Mathematics is a tool used for solving problems (Leonard, Steve, & Art 2004). Mathematics knowledge and skills provide a key for entry into a rapidly changing technological world (Leonard, Steve, & Art 2004). Ukeje in Lawrence & Kolawole (2007) while acknowledging the importance and contribution of mathematics to the modern culture of science and technology stated that "without mathematics there is no science, without science there is no modern technology and without modern technology there is no modern society. Also, Obodo in Unamba, Obiuwevbi, Irebuisi & Ojediran (2021).Opined that mathematics can contribute to the realization of the general aims of education among others, by: developing good habits, intellectual independence, the ability to differentiate between relevant and irrelevant data; providing competence in basic skills and so on.

Akinmola (2014) identify the aims of learning mathematics education in schools as follows. Acquire the necessary mathematical concepts and skills for everyday life and for, continuous learning in mathematics and related disciplines. develop the necessary process skills for the acquisition and application of mathematical skills concepts and skills, develop the mathematical thinking and problem solving skills and apply these skills to formulate and solve problems, recognize and use connections among mathematical ideas and between mathematics and other disciplines, develop positive attitudes towards mathematics, make effective use of a variety of mathematical tools (including information andcommunication technology tools) in learning and application of mathematics, Provide imaginative and creative work arising from mathematical ideas, develop the abilities to reason logically, communicate mathematically and learncooperatively and independently. According to Sidhu (2006), the aim of learning mathematics is not only for knowledge and understanding objectives; it includes skills application, positive attitude, appreciation and interest objectives of which, among other things, the learner should: To achieve its stated objectives there must be a crop of dedicated and resourceful teachers.

Teachers are the hub of the educational system. Teachers are the most important factor in students learning next to students themselves (Knapper & Wright, 2001). As such, the importance of teachers, the

application of pedagogical knowledge into classroom-oriented plan of actions constitute most essential fabric upon which the success of the school, its administration and the entire education system rest upon (Okolocha & Onyeneke, 2013). Education can bring about desirable transformation of one's culture of learning, mindset, and orientation values. This can only happen in learners when the teacher possesses a good mastery of the subject matter, have a map to follow in terms of well-prepared lesson, grab the student's attention through effective class control mechanism, recognize student attention span, plan activity for the students by allowing them participate actively in the teaching and learning process. To this end, Ademola (2007) stated that an educational system with low quality teachers will produce students with poor inspiration and aspiration. Such students, Ademola opined will not grasp enough of the subject matter and cannot learn with ambition. Similarly, Babalola (2009) posited that experience in Nigeria has revealed that students' academic achievement at different levels of the schools largely depend on the competence and dedication of the teacher who has a significant role to play in the reshaping of the creative potentials and ability of students.

From the above, it becomes imperative that mathematics teachers should be able to cope with the ever changing knowledge of technology and ensure that students acquire requisite knowledge, skills and values. It should be appreciated that the influence of the teacher on students' personal, social and productive lives is usually the product of the professional training which they received. It probably explains why FRN (2013) stated in her national policy on education that the primary implementers of a nation's education policies and that no country can develop beyond the quality of its teachers'. Thus, teachers have to be well prepared for their job through pre- and in-service training. This sound training should at the end help the teachers in the implementation of the curriculum as they engage in effective teaching, for pleasant and meaningful understanding of students in order to achieve set objectives in the classroom.In order to promote the teacher effectiveness, it is important to produce high quality teachers. These teachers should maintain approved lesson period, utilize visual resources, voice, eye contacts and body movement as a way of stimulation the students, summarize lesson and evaluate lesson using all sort of techniques.

Teachers' effectiveness has been accepted as a multidimensional construct since it measures a variety of different aspects of teaching such as; subject mastery, effective communication, lesson preparation and presentation (Onyeachu, 2020).Teacher effectiveness according toAfe (2003) is the type of teaching characterized by the exhibition of intellectual, social and emotional stability, love for children and positive disposition towards the teaching profession and ability to inspire good qualities in students. It was also defined by Vogt in Nwoke (2020) as the ability of instruction to inspire students of different abilities while incorporating instructional objectives and assessing the effective learning mode of the students. According to Evans (2006) teaching effectiveness is a measure of the extent of realization of the instructional objectives. It is a net growth in intellectual aptitude and skills as measured by students' achievements. Sanders' (2019) and Wenglinsky's (2000) work asserted that teacher effectiveness is the single biggest contributor to students' success. Stronge, Ward and Grant (2011) identified four dimensions that were used to characterize an effective teacher asInstructional effectiveness, Uses of assessment for student learning, Positive learning environment andPersonal quality of the teacher.

An effective teaching should not only be concern with students' academic goals. Teachers' effectiveness should encompass concern for students' personal goals. Students enter into classroom from different background and they have come to the class with different mind apart from academic which an effective teacher should bear in mind. An effective teacher should always maximize instructional time and make good use of it (Stronge, Ward and Grant, 2011). A teacher who wastes time in classroom discussing on nonessential thing is not effective. An effective teacher must have a high expectation about learning. A teacher who has low expectation of his or her students about learning a concept would not care if at the end of the teaching students doesn't understand the concept. If on the other hand, the teacher had aimed high on students understanding of the concept; but at the end of the lesson the students don't understand, the teacher should be moved to seek for the cause and possibly teach the concept again for improvement in understanding.Effective teacher especially in mathematics make use of different type of technologies in his or her classroom (Aina, 2013a). There are many applications of technologies in teaching and learning depending

on the knowledge of the user (Collis and Moonen in Nguyen, Williams and Nguyen 2012). The use of technologies is an imperative for all effective teachers in schools today. Effective teachers do not ignore complex concepts or topics in the mathematics curriculum but rather he or she will do everything possible as an effective teacher to ensure that such concepts are meaningful to the students. Assessment and feedback is very important to students learning. Aina and Adedo (2013) found that feedback is very important in teaching and learning because it improve student learning. Every effective teacher should know how, when and the type of assessment and feedback needed in his or her lesson. We have different types of assessment, whichever form it might take, assessment activities take much time of the teachers and has an important place both in teachers and students' lives (Ceyhum and Erodogan, 2013).Maintaining a positive environment for learning is the responsibility of an effective teacher. It is easy to distinguish between a teacher who is effective and the one who is not effective by the way hemanages their classroom when lesson is going on. Managing classroom very well for effective learning is the responsibility of an effective teacher. The ability of teachers to organize classrooms and manage the behavior of their students is central to achieving good educational outcomes (Oliver and Reschly, 2007). Orji (2014) affirmed that effective teaching requires among other things basic management skill which include understanding of the nature of classroom. Oliver and Reschly, (2007) cited Berliner that the teacher who have problems in classroom discipline is frequently ineffective in classroom.

An effective teacher will always interact well with students both within and outside the classroom because this is very important to students' learning. Interaction between teacher and student in school is very important and effective teachers should ensure maximum interaction that will enhance learning in the classroom. Aina (2013b) faulted lack of adequate interaction between teacher and student as one of the reasons students do not perform well academically, interest and achievement of students lie within the teacher and students interaction/relationship in a given subject (Onah and Ugwu, 2010). Creating classroom environments that promote positive cultures with healthy interactions can motivate students to channel their energies and desires to reach their goals (Nugent, 2009).Teacher-students interaction is very important in school as it improve student success. The interaction between teacher and student is

essentially the fundamental basis for teaching. A good teacher-student relationship may be even more valuable for students with behavior and Meaning challenges (Caballero, 2010).Most students learn best in the environment where they are able to freely express their feeling and this could be a situation when they are free with the teacher. Knoell (2012) agreed that learning occurs best in an environment that contains positive interpersonal relationships and interactions and in which learner feel appreciated, acknowledged, respected and admired, students who enjoy a close and supportive relationship with a teacher are more engaged and work harder in the classroom, persistence in the face of difficulties and cope better with stress (Hughes and Kwok, 2007).Any effective teacher should know the importance of continuous assessment in teaching and learning and should ensure he/she regularly administers it to the students. Continuous assessment is recognized as one indicator of successful schools and successful students. Teacher should design continuous assessment that is more effective and encouraging which allows low-ability students to complete at the given time (Epstein and Voorhis, 2001). Content acknowledge is very important and a serious factor to be considered for any effective-teacher. It is what a teacher knows that he/she will teach students, Obodo in Unamba, Obiuwevbi, Irebuisi & Ojediran (2021)said if teachers are not sound in the content of what he or she teaches, there will be problem in both 'quality of learning and students' academic performance. There is no way a teacher who is deficient in the subject knowledge will be effective in teaching. When a teacher is not very sound in content knowledge he or she will have low self-efficacy. Teachers' effectiveness is very important in teaching which could be a factor to use in raising the academic standard of any dying school. Effective-teachers should have the knowledge and the skill requires achieving the goals (self-goals or school goals) and being able to use the knowledge and skill appropriately (Anderson, 2004).

Studies indicated that teachers' effectiveness increase students' academic achievement (Sanders and Rivers, 1996).Rivkin, Hanushek & Kain, (2000) investigated the effect of teacher experience on student learning have found a positive relationship between teachers' effectiveness and their years of experience. The evidence currently available suggests that inexperience teachers are less effective than more senior teachers (Rivkin, Hanushek, and Kain, 2000). Wenglinsky (2000) in Educational

Test Service (ETS) found out that teachers' classroom practices greatly influence students' academic achievements. Okon (2018) in a research study compared the performance of Social Studies students taught by effective teachers with the performance of students taught by ineffective teachers. The result showed that students who perceived their teachers as effective performed better in Social Studies than their counterparts who perceived their teachers as ineffective. Fuller (2019) also confirmed in their study that accredited teachers performed at about 91 percent better than unaccredited teachers in the classroom. Therefore, this study intend to determine the influence of teacher effectiveness on Pre-service Teachers' Satisfaction in learning Primary Mathematics

Hypotheses

The following hypotheses were formulated to guide the study:

HO1: There is no significant relationship between teacher effectiveness dimensions and pre service
Teacher satisfaction in primary mathematics.

HO2: Teacher effectiveness dimensions have no significant joint effect on pre service teachers'satisfactionin mathematics

HO3: Teacher effectiveness dimensions have no significant relative contribution to pre service teacher's satisfaction in primary mathematics

Method

The study adopted correlational survey research design.The target population of the study covered all the pre-service teachers in school of early childhood care education.A sample of three hundred and fifty (350) pre-service teacherswas used for the study, at the time of this study, by simple random sampling technique. Two research instruments were used for data collection: teacher effectiveness Inventory (TEI) meant for the mathematics teachers and Satisfaction in Mathematics Questionnaire (SMQ) completed by the Pre-service teachers. The TEI has six dimensions namely Commitments to teach 9items (Long, 2003; Smittle, 2003), Subject mastery 7items (Cross, 2000; Smittle, 2003), Non cognitive issues 8items (Smittle, 2003; Young-Jones, 2013), Innovative learning environment 7item (Pascarella&Terenzini, 2005), Communicate high

standards 8items (Cross, 2000; Wambach et al., 2000) ,Professional development 6items (Buskist et al., 2013; Smittle, 2003) and SMQ 15items (Gruber et al., 2010). The face and content validity of the instruments was assessed using three characteristics: content, construct and criterion-related validity (Sakthivel, Rajendran& Raju, 2005). The measure of content validity of the instruments showed the relevance, clarity, simplicity, and completeness of the instruments (Rodrigues et al., 2017). The alpha model for determining internal consistency is derived for all the six individual constructs.

The Cronbach α value for these six constructs ranges between 0.8268 and 0.8963. All the values are above the threshold value of 0.70 and demonstrate that the scales are consistent and reliable. The data collected was analyzed using the Computer Software Statistical Package (CSSP) for Science Release 23.00. The hypothesis was tested at .05 level of significance.

Results

HO1: There is no significant relationship between teacher effectiveness dimensions and pre service teacher satisfaction in primary mathematics.

Table 1: Relationship Between teacher effectiveness (Independent Variables) and Satisfaction in Primary Mathematics

Teacher effectiveness dimensions	**R**	**Decision**
Commitment to teach (C1	**0,626**	**Positive correlation**
Subject mastery (C2)	**0.848**	**Positive correlation**
Non cognitive issues (C3)	**0.344**	**Weak correlation**
Innovative learning environment (C4	**0.772**	**Positive correlation**
Effective communication (C5	**0.588**	**Positive correlation**
Professional development (C6)	**0.501**	**Positive correlation**
Correlation is significant at the 0.05 level		

Correlation analysis was implemented to determine the intercorrelation among dimensions. The results indicated in Table 1 show that all dimensions had positive correlation greater than 00.5 and was. Statistically significant at $p < 0.05$ except for the dimension of non-cognitive issues. The coefficient for non-cognitive issues was 0.344.

HO2: Teacher effectiveness dimensions have no significant joint effect on pre service teachers' satisfaction in mathematics

Table 2: Composite effect of Independent Variables on pre-service teacher's satisfaction inprimary Mathematics

Multiple R = .191 R Square = .037 .016 Adjusted R Square = Standard Error = 50.52					
Analysis of variance					
Source of	**SS**	**DF**	**MS**	**F**	**P**
Regression	**40743.**	**6**	**4527.05**		
Residual	**10720**	**350**	**2552.40**	**1.774**	**0.071**
Total	**11127**	**350**			

From table 2 coefficient of determination (Adjusted R^2) = 0.583 and this gives proportion of variance (Adjusted R^2 x 100) = 58.3%. This implies that the independent variables accounted for 58.3% of the variance in the dependent variable. The joint effect of teacher effectiveness improvement factors is significant factor on student' satisfaction inMathematics (F=1.774; df (9,420); P>0.05).

HO3: Teacher effectiveness dimensions have no significant relative contribution to pre service teacher's satisfaction in primary mathematics

Table 3: Relative Contribution of teacher effectiveness dimensions on satisfaction in Mathematics

	Regression of independent variables on pre-service teachers' satisfaction			
Model Constructs Cl	Standardized Beta .285	t 2.672	Sig,R^2	FSig.
			.008	
C2	.426	4.270	.000	
1 C3	-.128	-1.496	.137 .590	30.710 .000[b]
C4	.327	2.920	.004	
C5	.218	2.376	.019	
C6	.197	1.830	.021	
Cl	.265	2.495	.014	

	C2	.418	4.178	.000		
2	C4	.301	2.712	.007	.583	37.538 .000[C]
	C5	.185	2.072	.040		
C6		.117	1.903	.047		

Results in Table 3 shows that the value of R2 is 0.590. 5 out of the 6 dimensions showed statistical significance to student satisfaction namely commitment to teach *(1=2.612,* P=.008), subject mastery (t=4.270, P=.000), innovativelearning environment (t=2.920, P=.004), effective communication (t=2.376, p=.019), and professional development (t=1.830, P=.021). Backward elimination method automatically removed the dimension of non-cognitive issues since it was insignificant (t=-1.496, P = 0.137). In the second model, the value of R2 is 0.583; these dimensions successfully explain the indicator of pre service teacher's satisfaction. It is considered a good model to explain student satisfaction. The number of dimensions was reduced to 5 namely commitment to teach (t=2.495, P = 0.014), subject mastery (t=4.178, P=0.000), innovative learning environment (t=2.712, P = 0.007), effective communication (t=2.072, P= 0.040), and professional development (t=l, 903, P=0.047).The results of regression analysis indicate that the model is fit and exhibits positive and statistically significant relationship through F statistics. The R2 indicates that various dimensions explain 58.3% of variance in determining student satisfaction. This indicated that 58.3% of the variation on student satisfaction was explained by the variation of commit to teach, subject mastery, innovative learning environment, communicate high standards, and professional development.

The dimension of subject mastery is the most important aspect with coefficient (Beta = .418) followed by innovative learning environment (Beta = .301), commit to teach (Beta = .265), communicate high standards (Beta = .185), and professional development (Beta = .1-17) respectively.

Discussion

This study provides a useful insight into the importance of teacher effective effectiveness that improve quality education thus pre service satisfaction. Seng and Ling (2013) state that focusing on student satisfaction will enable schools adapt to student needs and continuously

monitoring the delivery of services as a way of increasing student satisfaction. This study concurred with a few findings of Rivkin, Hanushek & Kain, (2000) investigated the effect of teacher experience on student learning have found a positive relationship between teachers' effectiveness and their years of experience. The evidence currently available suggests that inexperience teachers are less effective than more senior teachers (Rivkin, Hanushek, and Kain, 2000). Wenglinsky (2000) in Educational Test Service (ETS) found out that teachers' classroom practices greatly influence students' academic achievements. Okon (1998) in a research study compared the performance of Social Studies students taught by effective teachers with the performance of students taught by ineffective teachers. Independent t-test was used to analyze the data and the analysis showed that the mean (x) score for students taught by effective teachers was 63.00 and Standard Deviation was 14.18 and the mean (x) score of students taught by ineffective teachers was 40.38 and Standard Deviation (SD) was 15.63. The comparison yielded a t-ratio of 12.40, which was statistically significant at .05 levels of significance, and 298 degrees of freedom. The result showed that students who perceived their teachers as effective performed better in Social Studies than their counterparts who perceived their teachers as ineffective.

The results revealed that pre service teachers satisfaction in mathematics was a multidimensional construct. The level of satisfaction was influenced by the commitment to teach, subject mastery, innovative learning environment, effective communication, and professional development, accounting for 58% of the variance in student satisfaction. Subject mastery was the most important aspect that influenced students' satisfaction. This finding was reflected in previous study done by Ghazi (2013) which indicated that teacher's professional competencies in knowledge of subject matter play important role in students' achievement.

Multiple regression analysis revealed that commitment to teach, innovative learning environment and communicating high standards had similar importance explanatory power towards student satisfaction. This was not surprising that communicating with students and getting close to them, discovery of new teaching tools and use of digital resources were considered as most effective teaching methods and a strong predictor of student satisfaction. This result sustained the earlier studies done by Chen et al. (2007) which revealed that student-teacher interaction and teaching

quality contributes to better learning experiences and positively influence student satisfaction. Nadiri (2011), O'Driscoll (201.2) all state that teachers and teaching methods are critical influence of student satisfaction.

The professional development factor accrued as the least influence on student satisfaction. This was rather influenced by personal factor such as reading professional journals, writing professional articles, taking courses, and attending professional workshops than the service provided by schools. However, this area needs to be investigated further in the future. Buskist et al. (2013) believe that professional development has significant impact on student satisfaction. An interesting finding for this study related to non-cognitive issues. Non-cognitive issues were a primary dimension extracted from the previous studies (Smittle, 2003) was insignificant predictor of student satisfaction. Cunha and Hechman (2008), Garcia (2013) reported that cognitive skills lead to non-cognitive skills, which consequently influence student satisfaction. This implies that non-cognitive issues play an indirect role on students' satisfaction.

Conclusion

The goal of teacher effectiveness in schools is to impart quality education so as to ensure students' satisfaction. In this study, students' satisfaction is satisfaction with teacher commitment, subject mastery, innovative learning environment, setting high standards, professional development. Students' satisfaction will be seen as students' assessments of the teacher effectiveness practices in schools. Student satisfaction surveys could serve two purposes in the years to come. First, as a more comprehensive tool for improving mathematics education and enhancing the student learning experience. Second, as a managerial instrument for adjusting and adapting undergraduate (pre service teachers) to a changing and tougher economic reality. Student learning, the ultimate measure of academic quality, would improve if students feel more secure about teacher effectiveness in schools. The results of the empirical study produced interesting fact that the most important dimension of teacher effectiveness is the subject mastery. The study would like to impress upon the importance of school leadership; this term should be synonymous with commitment to quality teaching and successful translation of ideals into practice. School management should put in place a system where top teachers who excelled academically are recruited. The study further

concludes that the three constructs,' commit to teach, innovative learning environment, and communicating high standards, which though not strong predictors are significant predictors. The responsibility of providing effective teaching with a student focus, dedication and creating congenial atmosphere for academic success rests wholly with teachers.

Recommendations

Based on the findings and conclusion reached, it was generally recommended

1. That teachers should be made to improve the skills involved in all the independent variables involved in this study through regular seminars, workshops, teachers retraining and in-service programmes.
2. Mathematics teachers should bring their wealth of experience in teaching to the level of the students' to make classroom interactions more interesting so as to arouse the interest of the students in the subject. This would assist in solving the problem of poor academic performance and anxiety among students and improving widely the acclaimed fallen standard of education in, Nigeria.

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