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The Impact of Teaching Practice on Female Students' Preparation for Mathematics Teacher Education Programme in Delta State University, Abraka, Nigeria

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Abstract. This small sample study was conducted to investigate the impact of teaching practice on female students' preparation for mathematics teacher education programme. The design adopted was a descriptive survey research design. A sample of 30 female students was selected from 50 students who have participated in teaching practice programme for the degree programme at Delta State University, Abraka, Nigeria. Data were collected through closed-ended and open-ended questionnaires administered to the sampled students, and teaching practice supervisors, co-coordinators, and heads of Departments from the school where the students did their teaching practice respectively. The data were analysed using descriptive statistics and by categorising the responses of the participants according to the theme of the study. The findings include, amongst others that teaching practice beyond enhancing the students' preparation for mathematics education programme, it helps female students to develop more interest and confidence in studying and teaching mathematics. Following the findings, recommendations for mathematics teacher education programme were made. It was recommended amongst others, that there is need to continue to use teaching practice programme to prepare pre-service teachers in mathematics education.

Keywords: teaching practice; Teacher Education Programme; Mathematics; female students; teacher preparation

1. Introduction

Education, as the instrument for economic and political wellbeing, has teaching as its major catalyst (Potokri, 2011). Regardless the profession or field of study, teaching is the driving mechanism that makes the learning and teaching process and experience possible and meaningful. Female education and national development are fundamental to development in the 21st century. It is thus, not surprising to see an increase in the enrolment rates of females in institutions of higher learning (Potokri, 2013).

Despite the enrolment rate increase, the number of female students in mathematics and science is still low when compared to other subject disciplines (Marsh et al. 2019; He et al., 2020). Makamure's (2016) doctoral study at the University of the Free State, South Africa underpins teaching practice as one medium by which the zeal of studying mathematics and willingness to teach the subject can be improved. With a quantitative case study approach that targets Delta State University, this study focuses on the impact of teaching practice on female students' preparation for mathematics teacher education programme.

2. Background

Teaching practice is the process whereby trainee teachers practice how to teach or the act of teaching in order to become perfect in teaching to make the learner to acquire some knowledge or experiences in a particular topic or subject (Ajaja, 2013). It is done in a particular period of time. Hence, teaching practice is a period that a student teacher spends teaching in a school as part of his or her training in a college or university education programme. From the above explanation, teaching practice is done by a student or someone who is undergoing training on how to teach. Therefore, it is compulsory for all students in the Faculty of Education at Delta State University, Abraka. Policy documents for teacher development suggest that teaching practice is mandatory for education degrees (Department of Basic Education, 2011). It is thus not surprising that teaching practice is equally compulsory for all students studying for degree and postgraduate diploma in education at the University of Johannesburg, the affiliation of the second author of this study. The purpose of teaching practice therefore is to give students the opportunity to practicalise what they learn in the classroom (Ijeh, 2013).

In Nigeria today, teaching is seen as a profession. For a teacher to be employed to teach, he/she must pass the prescribed examination and be registered as a teacher (Teachers Registration Council of Nigeria, 2018). In schools where teachers are not available, student teachers or in-service teachers may be used to augment the inadequacy of those qualified teachers. By involving themselves in teaching practice, the mathematics student teacher can adequately be prepared for the profession.

Mathematics is the study of quantity, structures, numbers, space and change (Nwoke & Nnaji, 2011). It provides the route to the scientific and technological discovery (Chand et al, 2019). To understand mathematics, researchers have introduced several strategies for the improvement of students' learning

(Fakomogbon, 2002). One of these strategies is the development of teaching practice programme for pre-service and student teachers. Teaching practice plays a significant role in the preparation of students for teacher education programme. The teaching practice enables the student teachers practice what they learn during classroom instruction in colleges and universities (Aglazor, 2017). It plays a vital role in the education programme in the college and university education system (Ahawo, 2010).

Teaching practice is a practical experience which takes place for a period of six (6) to twelve (12) months at Delta State University Abraka. The student teacher must participate in this programme before he/she will be awarded a degree in Education. Therefore, the teaching practice is a significant aspect of mathematics teacher education programme in our tertiary institution. Anger (2014) noted that teaching practice exposes the student teachers on how to keep good classroom management as well as how to blend theory with practice. A good teaching practice programme is the key influence on students learning in other to achieve the desired outcome as well as the primary goal of higher educational institutions. Biggs (2013) affirmed that all components of the curriculum must align with effective teaching and learning to take place. For instance, mathematics assessment tools and strategies must be aligned to the mathematics learning outcome.

The teacher should be trained educationally and morally to be able to perform the job of teaching effectively. During teaching and learning, the teacher should ensure that he/she establishes a good relationship between himself/herself and the students, motivate and create opportunities to increase students' interest in the learning process. The teacher must consider as many methods as possible and know which of them is best to teach a particular topic. This study intends to find out the impact of teaching practice on the students' preparation for mathematics teacher education programme in Delta State University, Abraka.

3. Statement of the Problem

In recent time teaching practice in Nigerian institutions is gradually losing its value due to inability of the students and school management to manage teaching practice programme to the advantage of the students, institution management and the school where the teaching practice is done (Jekayinfa et al., 2012). This is because some students do not fully participate in it or inability of the management of teaching practice programme to balance the period of the programme with that of the visiting schools (Msangya et al., 2016).

In every faculty of education, someone is responsible for co-ordinating teaching practice. That person is referred to as the chief coordinator of teaching practice at the Delta State University Abraka, the research site of this study. The chief coordinator's report on teaching practice programme in 2018/2019 showed that very few students perform above average during the teaching practice programme. The report further noted that about 35% of the students that participated in 2018/2019 score between 50% in the aspect relating to teaching and learning as well as classroom management. While a teaching practice teacher

is expected to explore relevant knowledge, skills, attitudes, values and teaching technique to improve his/her academic achievement the subject matter content knowledge, skills as well as instructional skills and strategies displayed during supervision has not been encouraging. This may lead to the student teacher poor academic achievement or performance.

If the teaching practice is properly organized, it could improve student teacher subject matter content knowledge, skills, attitude, use of varying techniques for teaching as well as ability to be resourceful in terms of the provision of adequate instructional resources. These provisions will undoubtedly play a significant role in the student teacher preparation in mathematics education programme especially when gender is thrown into the debate. The problem of this study is therefore what is the impact of teaching practice on the female student preparation for mathematics teacher education programme?

4. Preparing Teachers for Mathematics Education Programme

To prepare teachers for mathematics education programme, several factors could guide the preparation programme. These factors include school subject teachers, government policies and other relevant stakeholders. These factors have a huge role to place in the achievement of teacher education programme as the overall achievement of the objectives of tertiary education. The collective support of these stakeholders is needed if the programme will record a success. They are therefore require to find proper ways of achieving the goals of teacher education programmes (Ackerman et al. 2016). For instance, the school should be able to provide the adequate facilities and conducive learning environment for the trainee teachers and their students.

However, the Nigeria education system remain poor despite all effort made to improve the quality of teaching and learning (Onwuameze, 2013). Teacher leadership is a resource for providing unlimited resources for positive outcome in teaching and learning. The teacher's commitment as a leader should be supported by the school management. The school principal should skilfully support, provide a conducive learning environment and organisational climate (Ackerman, et al., 2016). Good leadership should be able to provide an environment permissible for quality teaching and learning. Quality teaching should be aimed at quality learning. Students' academic achievement is one of the criteria for measuring quality teaching.

The teacher should be given adequate workload for optimum performance. Sichambo (2011) recommend that the teacher workload should be reduced to the level at which they should be able to conduct effective teaching and learning. Valiandes and Neophytou (2018) established that reducing class size as well as workload with adequate training and retraining of teachers are some of the measures that can be taken to improve students' learning experience. Inadequate staff could affect the provision of quality education. While the government should endeavour to employ quality mathematics teachers, the college and university should be able to create educational programme that can provide the qualified teachers to assist in the provision of quality education. According to Mayeku (2019), shortage of teachers can increase the workload of existing staff, thereby

affecting the quality of instruction. Odumbe et al. (2015) on the other hand opined that low teacher-pupil ratio can enhance the teacher performance in terms of teaching and learning.

Practicing teachers should be encouraged to participate in teacher development programme. This has a huge influence on the overall quality of the teacher and will definitely aid in the achievement of the objectives of education. Adequate provision of mathematics teacher professional development has the ability to improve teacher subject matter content knowledge and confidence in delivery of the content of the mathematics lesson. With mathematics teacher professional development, more experiences with regards to teaching and learning are enhanced, and this goes a long way to improve the quality of education (Ijeh, 2013).

During teacher professional development as well as colleges and universities education programme, mathematics student teachers should be taught how to improve attitude towards mathematics teaching and learning. Such attitude may include punctuality, dedication to teaching, openness to new ideas, be resourceful to search for better method of teachings as well as create more opportunities to cover the curriculum (Nakhanu, 2019). Therefore, the impact of teaching practice on students' preparation programmes should be investigated. In the case of this study, the focus is on the impact of teaching practice on female students' preparation for mathematics teacher education programme in Delta State University, Abraka, Nigeria.

5. Research Questions

1. How significant does teaching practice influence the academic achievement of female mathematics education students in Delta State University?
2. What are the roles of teaching practices on female students' preparations for mathematics education programme in Delta State University?

6. Methodology of the Study

This study is anchored on the quantitative case study approach, that entails the collection and usage of numerical data to understand a case that is studied. A case study is a research approach that is used to generate an in-depth understanding of an issue in its real-life context (Ebneyamini & Moghadam, 2018). The case studied is that of teacher education programme at the Delta State University Abraka, Nigeria. Descriptive survey research design was employed. This design allowed the researchers to obtain responses about questions from the respondents or participants of this study. In other words, the purpose of using this design is to explain the responses of the subject/respondents about the impact of teaching practice on female students' preparation for mathematics education programme in Delta State University.

6.1 Population of the Study

The population of the study comprised of female mathematics education students in the department of Science Education. Purposive sampling was used to determine the sample. Following Bertram and Christiansen's (2014) writing, purposive sampling is the selection of individuals with suitable experience that

can provide the required information for this study. A sample of 30 students were purposively selected from 50 students who have participated in at least one of the two teaching practice programmes organized for the students in the four-year mathematics education degree programme. The sample is thus 60% which is adequately representative. Grinnel and Williams (1990:127), affirm that 40% is sufficient for performing basic statistical procedures. In addition, five lecturers who supervised the mathematics education students and members of the teaching practice coordinating team were selected and five other teachers (head of mathematics department) from the schools where the student teachers did their teaching practice also served as respondents or participants.

6.2 Data Collection Instrument

The instrument(s) that were used for data collection is the questionnaire. In sum, two questionnaires– one for the students and the second for the supervisor (lecturers) and head of departments (in school of practice) were used. The questionnaire for student teachers consists of twenty-item questions and made up of five different sections namely subject matter content knowledge, teaching and learning, lesson planning and preparation, attitudes and extra-curricular activities. Each section comprises of four questions. The one for the supervisor (lecturers) and head of departments (in school of practice) have five items question each focusing on subject matter content knowledge, teaching and learning, lesson planning and preparation, attitudes and extra-curricular activities. Some open-ended questions as shown in the presentation of result and analysis section of this article were used to get responses from this category of respondents. The instruments were validated by two experts in mathematics education and measurement and evaluation from two different Universities. The reliability coefficient of the questionnaire was 0.81.

6.3 Data Analysis

The data collected were manually analysed with descriptive statistics such as mean and standard deviation. An overall mean of 2.50 and above would indicate that an item plays a significant role or not on the student teacher preparation for mathematics teacher education programme as well as an achievement in the student-teacher mathematics education programme (Sanni, 2002). Accordingly, if mean score is higher than the average of the critical mean scores, it can be interpreted that the performance has significantly improved or better.

7. Data Presentation and Analysis

Research Question 1: How significant does teaching practice influence the academic achievement of female mathematics education students in Delta state University?

In answering this research question, the individual mean responses of the student teachers to the questionnaire items were determine and later the overall mean is calculated for each of the variable such as the subject matter. content knowledge, teaching and learning, lesson planning and preparation, attitudes and extracurricular activities.

Table 1. Responses of the students' teacher on enhancing subject matter content knowledge for participating in teaching practice.

S/N	Question Items	Mean Response	% Mean Response
1	Ability to explain concept with varied examples	3.7	25.5
2	Use of calculation Skills	3.9	27.5
3	Problem Solving Skills	3.2	23.0
4	Application to other subject area	3.4	24.0
	Total	14.2	100
	Overall Mean	3.55	

Since the overall mean response 3.55 is greater than 2.50, it means that teaching practice enhances the subject matter content knowledge of student teachers.

Table 2. Responses of the Students Teacher on enhancing effective teaching and learning.

S/N	Question Items	Mean Response	% Mean Response
1	Focus on Objective	4.2	29.5
2	Linking teaching with previous knowledge	3.2	23.0
3	Use of Instructional technique	2.8	15.5
4	Conclusion / Valid Assignment	3.0	21.0
	Total	13.2	100
	Overall Mean	3.3	

The overall mean of 3.3 is greater than 2.50. This indicates that teaching practice enhances the knowledge of teaching and learning Mathematics.

Table 3. Responses of the students teacher on enhancing lesson planning and preparation in Teaching Practice

S/N	Question Items	Mean Response	% Mean Response
1	Planning of lesson	4.5	29.6
2	Use of Instructional resources	3.2	21.0
3	Focus on objective to be achieved	4.0	26.4
4	Classroom Organization	3.5	23.0
	Total	15.2	100
	Overall Mean	3.8	

From Table 3, the overall mean of 3.8 is greater than 2.50. This means that teaching practice plays a significant role in enhancing student teacher knowledge for planning and preparing of mathematics lesson for effective teaching.

Table 4. Responses of the students teacher on enhancing positive attitudes towards teaching and learning.

S/N	Question Items	Mean Response	% Mean Response
1	Mode of Dressing	3.6	22.0
2	Students motivation towards learning	3.8	23.1
3	Continuous Feedback	4.2	25.6
4	Punctuality	4.8	29.3
	Total	16.4	100
	Overall Mean	4.1	

Table 4 showed that the overall mean of 4.1 is greater than 2.50. This indicates that teaching practice enhances students' teacher positive attitude towards the teaching and learning of mathematics.

Table 5. Responses of the students teacher on enhancing student teacher participation in extracurricular activities

S/N	Question Items	Mean Response	% Mean Response
1	Games	4.5	29.8
2	Checking students punctuality	3.8	25.2
3	Class teacher	2.8	18.5
4	Meetings	4.0	26.5
	Total	15.1	100
	Overall Mean	3.77	

In table 5, the overall mean response of 3.77 is greater than 2.50. This indicates that teaching practice have influence on the academic achievement of students. The participation in extracurricular activities enhances their academic achievement in mathematics education.

Table 6. Influences of teaching practice on student teacher academic achievement in Mathematics Education

S/N	Variables	Overall Mean
1	Mathematics Subject matter Content Knowledge	2.84
2	Teaching and Learning of Mathematics	2.84
3	Lesson Planning and Preparation	3.04
4	Attitudes	3.28
5	Extra-Curricular Activities	3.02
	Total	15.02
	Overall mean	3.00

Table 6 showed the overall mean score of 3.00 is greater than 2.50. This is an indication that teaching practice has some influences on the academic achievement of the mathematics student teachers.

Research Question 2: What are the roles of teaching practices on female students' preparations for mathematics education programme in Delta State University?

In answering this research question, references will be made to table 6 and the open-ended questions responses of the supervisors and Head of Departments of mathematics in the school where the student teachers did their teaching practice.

The mean score 3.55 of the student teacher responses to question relating to whether they were able to improve on their Subject matter content knowledge during the teaching practice programme, or not was greater than 2.50. The result is in line with the responses of the heads of department and the teaching practice supervisor's responses to open-ended questionnaire. In the question – Does the students show any evidence of improvement on their mathematics subject matter content knowledge during the second teaching practice programme? The Head of department answered that the student teachers were better in their approaches to teaching in the second teaching practice exercise. According to him, they were able to vary the method of teaching as well as having adequate knowledge of the topics they taught and learnt by the students.

The teaching practice coordinator also reported that the score of the students in the second teaching practice exercise was better than the first one with a significant difference in favour of the second teaching practice. Following the result in table 6, the overall mean of the related variable that enhances the student teacher achievement is 3.00. It is evidence that the overall mean of those attributes that can ensure an achievement of the participants on the teaching practice programme is greater than 2.50. One can therefore deduce that teaching practice play a significant role in the students' preparation for mathematics education programme at Delta State University. For example, when the teaching coordinator was asked, Does the teaching practice enhance knowledge of subject matter content, teaching and learning, knowledge of lesson and preparation, attitude and extracurricular activities in the school? The coordinator reported that the teaching practice provided a more adequate opportunity for the student teacher to develop adequate knowledge of the subject matter content for teaching, use various techniques, lesson planning and preparations, positive attitude towards teaching and learning and participation in extracurricular activities in the school system.

Furthermore, the teaching practice coordinator reported that while the mean score on teaching and learning in the first teaching practice was 61.50, the mean score in the second teaching practice was 68%. In terms of lesson planning and preparation, the heads of department in the school in which the teaching practice was done reported that the student teachers prepare and deliver their lessons at the appropriate time. The teaching practice coordinator also indicated that about 80% of the students can adequately prepare and deliver their lessons during their second teaching practice exercise. When the coordinator was asked, how well did they prepare and deliver their lesson? The coordinator reported that an average of about 68% of the mathematics student teachers scored above 65% in their first teaching practice exercise, but in the second one, about 80% of the students' scores an A, which is between 70-100%.

The Head of Department was asked, were the mathematics student teachers punctual to the school and class? How friendly were they with the students? The head of department indicated that the student teacher was always punctual to school and even classes. He further explained that they participated in organizing the morning devotions and cleaning of the classroom and school environment. They were also dedicated and friendly with the students and staff. The coordinators of the teaching practice programme also reported that they were readily available on their duty post during the teaching practice supervision. There were evidence of monitoring of students' class activities in the teaching practice handbooks as well as the student class activities in the students' exercise book. Following the above report, one can deduce that the student teachers display positive attitude that could enhance their knowledge of teaching and learning in mathematics education.

From table 6, the mean score of the students' involvement in extracurricular activities is 3.02 greater than the critical mean of 2.50. This shows that the student participated in extracurricular activities while on the teaching practice exercise.

8. Discussion of Result

It is evident in this study that the female students' mathematics subject matter content knowledge, teaching and learning, lesson planning and preparation, attitude and extracurricular activities are developed during teaching practice. Ability to adequately develop this knowledge and use them during classroom practice could enhance the teachers' achievement in mathematics and as well prepare them for teacher education programme.

From Table 1, the calculated mean response of the student teacher is 3.55 which is greater than 2.50. This showed that female students mathematics teacher subject matter content knowledge could be influenced by participating in teaching practice. Consequently, the participation in teaching practice programme can prepare the student teachers for effective Mathematics teacher education programme. When the head of department was asked, "did the student teachers display evidence of improvement of their knowledge of the topic taught to the students? He answered that the students were more explicit in the teaching of the mathematics at the level of the students. This result is in line with Bruce et al. (2013) who opined that teaching practice and the development of subject matter content knowledge for teaching could influence teacher preparation programme in a subject area such as mathematics.

The result in table 2 showed that calculated mean of 3.3 was greater than the critical mean of 2.50. This indicate that teaching practice enhance effective teaching and learning which will consequently improve student teacher preparation for mathematics education. The report of the teaching practice coordinator showed that teaching practice influence the development of the knowledge for teaching and learning of mathematics. This concurs with Ajaja's (2013) research. He (Ajaja) argued that students learn better by practicing rather than been passive. This finding also gives credence to that of Anger (2014) who

noted that teaching practice play a significant role in the preparation for mathematics education. According to Anger (2014), by participating in teaching practice programme, student teacher develops better knowledge for teaching and learning.

Table 3 shows that lesson planning and preparation influence the mathematics teacher preparation for mathematics education programme. This means the mean score of 3.8 was greater than 2.50. This indicates that ability to plan and prepare for the lesson influence the student teacher achievement and preparation for the mathematics education programme. While the head of department reported that student teachers adequately prepare and delivered their lesson appropriately. The teaching practice coordinator also noted that there were evidence of lesson planning and preparation in the student teaching practice handbook during supervision. This establishes the importance of student lesson planning and preparation. It is thus not surprising that student lesson planning and preparation is the key influence in the preparation of mathematics education programme (Federal Government of Nigeria, 2018). This finding agrees with Regan et al. (2016) who reported that lesson planning and preparation play a significant role in mathematics teacher programme.

In Table 4, a mean achievement score of 4.1 was greater than the critical mean of 2.50. This indicated that the student teachers' attitude has significant influence on the mathematics students' preparation for education programme. The response to open-ended question from the head of department showed that the student teachers display a more positive attitude towards their teaching, students and staff during their teaching practice duty as well as establishing good relationship with the students and staff. The teaching practice supervisor also indicates that there was evidence of punctuality to duty. The student teacher dress properly and gives continuous feedback to the students. This finding agreed with the report of Deveci and Seikkula-Leino (2018) who noted that the teachers' attitude plays significant role in preparation for teacher education. According to this author, the student teacher must be prepared to participate in all that will make for effective teacher education. This involves the acquisition of the subject matter content knowledge, punctuality to duty, motivating student to learn, dressing, and providing continuous feedback to the students. Yara and Wanjohi (2011) also noted that student teacher attitude is a predictor of the achievement in mathematics education.

Table 5 showed a mean of 3.02 which is greater than the critical mean of 2.50. This showed that participation in extracurricular activities can enhance student teachers' preparation for mathematics education. In other words, student teachers' participation in extracurricular activities play significant role in preparation for effective teaching and learning in mathematics in the school system. Hensch (2020) noted that teacher involvement in extracurricular matters in the college matters a lot in their preparation for classroom practices. This author also noted that participation in extracurricular activities help teachers who are in this case student teachers to transfer job-related knowledge for the future preparation of students. One can also gain essential life skill by participating in

extracurricular activities especially working with one another as well as their own students.

9. Limitation

This is a small sample study that was conducted to investigate the impact of teaching practice on female students' preparation for mathematics teacher education programme. Given that this study utilised the quantitative research approach, we thus acknowledge that the sample is indeed small, hence, can be regarded as a limitation. Nonetheless, we argue that the small sample does not compromise the quality and results of the study because the sample is representative of the study's population which we as the researchers cannot do anything about but draw from or use. In the light of this limitation, we would like to direct future researchers to consider a research context or site with a larger population should they wish to conduct a study that is similar to this current study.

10. Conclusion

The study concludes that the impact of teaching practice on female students' preparation for mathematics teacher education programme in Delta State University, is statistically significant. It highlights that during teaching practice, female student teachers can develop their subject matter content knowledge, knowledge for teaching and learning, lesson planning and preparation, development of positive attitude to teaching and learning as well as improve their participation in extracurricular activities in the school system which are all parts of the roles of teaching practice. Consequently, the sampled students' achievement in the aforementioned areas can meaningfully, adequately, and readily position them for their future occupation which is teaching and thus, help them to overcome the challenges that they are likely to face as beginner teachers outside their studentship terrain at the university.

When juxtaposed with literature, the roles of teaching practices on female students are not different to that of any student regardless their gender. The study therefore recommends that there is need to continue to use teaching practice programme to prepare pre-service teachers in mathematics education. Given the responses elicited from the head of department, supervisors and chief coordinator of teaching practice, the study importantly points to adequate teaching practice supervision as a crucial element for the preparation of mathematics education programme that must be ensured and encouraged in order to monitor and guide the student teacher.

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