



Teaching practice: Experiences of pre-service physics teachers

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Abstract

The experience pre-service teachers take to the teaching profession go a long way to determine their success level. This experience is usually learnt consciously or unconsciously, developed, and improved during their professional teacher training program. This paper adopts the concurrent mixed methods research approach to investigate the experiences of pre-service physics teachers after completing 2019/2020 teaching practice exercise. The investigation involved 84 final year college of education students in Nigeria. A semi structured questionnaire, which allows the collection of quantitative and qualitative strands of data simultaneously was used. Dewey's (1963) theory of experience was adopted to unpack the experiences of pre-service teachers. Findings from this study revealed that secondary schools have qualified physics teachers who have good mastery of the subject matter. This study concludes that experience pre-service teachers have during teaching practice exercise has capacity to determine how far they would go in profession.

Keywords: experience, physics, pre-service teachers, secondary school, teaching practice

INTRODUCTION

Several studies have emphasized the importance of teaching practice in the professional training of teachers especially, in the various teacher training colleges and faculties of education, in the respective colleges of education and universities (Amuda, 2017; Makamure & Jita, 2019; Mkhasibe & Mncube, 2020; Mokoena, 2017; Msangya et al., 2016; Sirmaci, 2010). Makamure and Jita (2019) opine that "teaching practice provides pre-service teachers with germane responsibilities, attitudes and skills that vary from their experiences as students". Many of these studies on teaching practice adopt the quantitative approach to investigate the experience of pre-service teachers (Amankwah et al., 2017; Ezeafuluke & Ezeobi, 2018; Msangya et al., 2016; Okoro, 2019). Some other studies adopt the qualitative approach to investigate the experience of pre-service teachers to teaching practice (Kiggundu & Nayimuki, 2009; Korhasan & Didis 2015; Mkhasibe & Mncube, 2020; Nuangchalerm, 2009).

Empirical studies by Makamure and Jita (2019), Mokoena (2017), and Mutseekwa and Mushoriwa (2021) used mixed methods approach to investigate the experience of pre-service teachers during practical teaching. Many of the studies focused on the challenges

and strengths faced by pre-service teachers during teaching practice (Amankwah et al., 2017; Chukwurah & Chukwurah, 2021; Ezeafuluke & Ezeobi, 2018; Koc, 2012; Mokoena, 2017) but others focused on the supports and mentorship pre-service teachers received from their teaching practice schools and teachers (Makamure & Jita, 2019; Mutseekwa & Mushoriwa 2021; Nkambule & Mukeredzi, 2017; Nuangchalerm, 2009). In what looks like a different focus, Mkhasibe and Mncube (2020) investigated the evaluation of pre-service teacher's classroom management skills during teaching practice. However, mixed methods studies into the experiences of pre-service physics teachers remain scarce (Mokoena, 2017; Mutseekwa & Mushoriwa, 2021) especially with a focus on teachers' content knowledge, knowledge about learners, adequate lesson presentation and teaching methods (Babatunde, 2016).

Also, studies into the experience of pre-service teachers during teaching practice have focused on mentorship and supervision, challenges faced by pre-service teachers, anxiety and classroom management, but much is unknown about pre-service teachers' assessing their cooperating teacher's mastery of the subject matter and the attitudes of secondary school physics students to learning physics. Again, there is scarce literature on pre-service teachers' opinion of the

Contribution to the literature

- Empirical evidence on the importance of teaching practice in relation to cooperating teacher's mastery of the subject matter, students' attitudes, and students' opinion of the secondary school physics curriculum is provided.
- Addition to the relative scarce literature on the importance of teaching practice in relation to cooperating teacher's mastery.
- Updated position of the characteristics (teachers' content knowledge, learners' knowledge, etc.) of in-service physics teachers in the research site, whose cooperation/association is crucial to the adequate and professional training of future (pre-service) teachers.

Table 1. Physics curriculum themes

Theme	Former curriculum	Current curriculum
Theme 1	Interaction of matter, space, & time	Interaction of matter, space, & time
Theme 2	Conservation principles	Conservation principles
Theme 3	Wave	Wave-motion without material transfer
Theme 4	Fields	Field at rest & in motion
Theme 5	Quanta	Energy quantization & duality of motion
Theme 6	-	Physics in technology

Nigerian physics curriculum and the assessment of equipment, and the infrastructural facilities that are available for teaching. This present study specifically investigates the experience of pre-service physics teachers during teaching practice with reference to their cooperating teacher's mastery of the subject matter, attitudes of secondary school students to physics, students and pre-service teachers' opinion of the Nigerian secondary school physics curriculum, and assessment of school equipment and infrastructural used for teaching in secondary schools.

Physics is an integral aspect of science that relies greatly on practical. Omoosewo (2012) define physics as the study of matter, energy, and their interaction. Physics is a subject that is closely related to other science subjects because of its crucial role in understanding the world around us. Bada et al. (2018) opine that physics is a focal point subject among the science subjects due to its relationship to the rest of the sciences. The study of physics plays important role especially to the development of a nation technological. As such, the development of devices such as television, phone and other technology driven products attest to the important role played by physics in making life easier for man. This has made physics to occupy a great height in the development of a nation technologically. Nations such as Nigeria keyed into goal of technological development by placing the study of physics in high premium through the establishment of her national policy on education (Federal Republic of Nigeria [FRN], 2013).

The secondary school physics curriculum is an official document, which specifies the physics content/topics to be taught at the secondary school level of education in Nigeria. It also specifies the objectives the nation intends to achieve through the field of physics education. Igwe (2000) define curriculum as "all the

learning, which is arranged or guided by the school, regardless of whether it is completed in group or separately inside and outside the school". The subject is one of the compulsory science subjects taught at the secondary level of education in Nigeria. The structure of the secondary school physics curriculum is spiral in nature, and it is based on two concepts- motion and energy. The current curriculum, which was last reviewed in 2009 has its contents arranged under six headings otherwise known as themes as against the old curriculum, which was arranged under five theme (Table 1). Secondary school physics aims at creating in students the comprehension of essential scientific activities. The objectives of physics in Nigeria as documented in the national policy of education (FRN, 2013) include the provision of basic literacy of physics for functional living in the society, acquiring fundamental concepts and principles of physics for future preparations, acquiring scientific skills and attitudes for technological applications of physics and to enhance and stimulate scientific creativity.

To realize the objectives set for the secondary school education, the roles played by physics teacher is crucial because teachers are saddled with the responsibilities of implementing the curriculum hence, there is the need for the adequate and professional training of teachers. In as much that physics teachers play an important role in achieving the objective for teaching physics, it is quite important to pay more attention to the professional training of these teachers so that one is assured that they can effectively discharge their duties towards the realization of the already identified objectives. Table 1 shows the themes of the secondary school physics curriculum, which when magnified leads to those aims and objectives that Nigeria intends to achieve through the field of education. The last curriculum review introduced a new theme "physics in technology" to the

already existing five themes. "Physics in technology" was added to further emphasize the practical nature of the subject thus creating a handshake between science (physics) and to technology.

Literature have emphasized the crucial role teachers play to the achievement of classroom objectives. The teacher is seen as a very important stakeholder in the attainment of classroom goals and objectives because, he implements the curriculum in the classroom. Up till date, the achievement of students is usually associated with the quality of teacher or the teaching that takes place in the schools. Akinbobola (2006) attest that teacher's characteristics such as the use of adequate instructional methods affects physics students' achievement in certificate examinations. Nuangchalem (2009) therefore argue that teacher training and development is a major act of growing up the quality of education. Bullough et al. (2002) also argue that professional experience has the most powerful influence in pre-service teacher education hence teaching practice was designed to expose pre-service teachers to the actual teaching experience to guarantee their effectiveness in the classroom. Teaching practice is a concept that is deeply rooted in a drive towards the development of competent and professional teachers (Nkambule & Mukeredzi, 2017). It is the practical aspect of teacher training program that expose pre-service teachers to the real classroom situation. Amankwah et al. (2019) define pre-service teachers as individuals who are currently undertaken a professional teacher training program in any teacher training college or university and whose contribution would determine the success level of the coming generation academically. Akbar (2003) also opine that it is the training provided to would-be teachers to expose and develop their skills in educational principles and its implications for teaching and learning.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

We adopt Dewey's (1963) theory of experience to unpack the process through which pre-service physics teachers learn and grow. Dewey's (1963) pragmatic theory of experience attempts to analyze and develop the process through which human beings learn and grow. Dewey (1963) believed in the continuity of experience and the connection between student learning experiences and students' future decisions and behaviors. This implies that the experience pre-service physics teachers are exposed to can go a long way to determine their experience in the future. Stark (2020) therefore opine that a person's current experience is shaped by their previous experience. This suffices to say that the approach physics teachers give to the teaching profession has the capacity to reflect their experience during their professional teacher training with teaching practice playing a major role.

In literature, several concepts have been used to refer to activities, where student teachers and/or pre-service teachers are placed in schools to gain teaching experience. Among the concepts used include practice teaching, field studies, infield experiences, school-based experiences, and internship (Mokoena, 2017). Mutseekwa and Mushoriwa (2021) define teaching as a complex activity that requires support for pre-service teachers during actual and after teaching practice. The researchers are of the opinion that the support given to pre-service teachers during teaching practice is crucial in assisting them overcome the complexity associated with teaching. Teaching practice gives student teachers the opportunity to translate theory to practice. This again was asserted by Hamilton-Ekeke (2016) who argue that teaching practice assist student teachers to bridge the gap between theory and practice.

Marais and Meier (2004) assert that teaching practice represents the range of experiences to which student teachers are exposed to when they work in classrooms and school. This range of experiences go a long way to determine how successful a pre-service teacher will be when he finally becomes a teacher. In the words of Nuangchalem (2009), the researcher opines that teaching practice provides real school situation for pre-service teachers to be successful and it also provides basis for further guidance. This is because teaching practice gives rooms for feedback after evaluation of pre-service teachers during and after teaching practice. It also allows the teachers/supervisors to identify pre-service teachers' areas of strength to consolidate on those areas and it also provides avenue to revisit and improved on identified areas of weakness(es) and challenge(s) that the prospective teacher might come across during the teaching practice exercise.

Teaching practice offers students teachers the opportunity to experience a learning situation that is unique and different from campus-based training (Tillema et al., 2011). Despite the myriads of the importance of teaching practice to the professional training of pre-service teacher, it can increase student teachers doubt about their ability to cope with unfamiliar situations, controlling and managing learners and establishing a good relationship with the supervisor (Perry, 2004). Teaching practice, sometimes called internship is a period during which pre-service teachers are offered guidance in learning (Amankwah et al., 2017). Andabai (2011) define teaching practice as the practical use of teaching principles, teaching techniques and practical exercise of different activities of daily school life. School experiences and teaching practice helps to carry the knowledge taught at the department to the national settings (Sirmaci, 2010).

Teaching practice is an important course in the quest of producing qualified and professionally trained teachers, who would assist the nation to realize her set goals through the field of education. Just like every other

nation, the Nigerian philosophy of Education strives to achieve this goal by producing competent and professionally trained personnel for the educational sector of the nation. Bruinsma and Jansen (2010) opine that teaching practice experiences for pre-service teachers are useful because pre-service teachers with positive teaching experiences have feelings of being capable and effective. Since teachers are the “heart and soul of the education enterprise” (Oyededeji & Oke, 2020), there is the need to encourage and ensure the adequate and proper preparation of teachers.

In Nigeria, teaching practice is a compulsory course for all aspiring teachers registered in a teacher training institution. Aglazor (2017) define teaching practice exercise as the culminating point, where the relationship among the university supervisor, cooperating teacher and the aspiring teacher interface to determine the quality of experience the aspiring teacher takes away. This suffices to say that the experiences pre-service teachers gather from the teaching practice exercise go a long way to determine who the pre-service teacher would be in the nearest future. The objectives of teaching practice are clearly stated by National Commission for Colleges of Education (NCCE). This include

“To expose student teachers to real life situation experiences under the supervision of professional teachers, to provide the forum for student teachers to translate educational theories and principles to practice, to enable student-teachers discover their own strengths and weaknesses in classroom teaching and provide opportunities to enable them address their weakness and enrich their strengths, to familiarize student-teachers with the school environment as their future work place, to provide student-teachers with an opportunity for further acquisition of professional skills, competencies, personal characteristics and experience for full time teaching after graduation, to help student-teachers develop a positive attitude towards the teaching profession, to serve as a means of assessing the quality of training being provided by teacher training institutions” (NCCE, 2012, p. 42).

The effectiveness of teaching-learning practices depends largely on the quality of teachers because no meaningful socio-economic and political development can take place in a nation without the teachers (Oyededeji & Oke, 2020). Nigeria and every other nation who appreciates the important role played by professional teachers should take teaching practice and by extension professional teacher education training seriously because of its crucial role to the development of the nation.

Current Study

This study investigates pre-service physics teachers experience during teaching practice. To do this successfully, we ask the question: what are the experiences of pre-service physics teachers during teaching practice?

METHODOLOGY

Research Design

This study is mixed methods research. Leech and Onwuegbuzie (2009) define mixed methods research to involve the “collection, analyzing and interpreting quantitative and qualitative data in a single study or a series of studies that investigate the same underlying phenomenon”. The researchers adopt the concurrent mixed methods research approach to investigate the experiences of pre-service physics teachers during teaching practice. Johnson and Christensen (2014) opine that the “triangulation of quantitative and qualitative data does not only involve the collection of mixed data, but it is used to validate and expand on the quantitative findings from a survey by including a few open-ended questions”. This method has been used by Makamure and Jita (2019) to explore the role of teaching practice to pre-service mathematics teachers. This type of design allows the collection of both types of data within one survey because the qualitative items are add-on to the quantitative survey. Creswell et al. (2003) however opine that this research design provides interesting quotes that can be used to validate and embellish the quantitative findings.

Respondents of the Study

This study involved final year pre-service physics teachers in a college of education in Ondo, Nigeria. Out of a total population of 96 pre-service physics teachers that participated in the teaching practice exercise during 2019/2020 harmattan semester, 84 pre-service physics teachers gave consent to take part in this study. The remaining 12 pre-service physics teachers did not consent or participate in the study due to reasons, which include inability to complete the teaching practice exercise, deregistration from the course, non-availability due to illness and lack of interest to participate in the study. The actual sample used for data analysis involved 87.5% of the total population and adequate care was taken to ensure and confirm that all the pre-service physics teachers did their teaching practice in Ondo. Creswell (2012) opined that the careful sampling of participants improves the validity of the research results while a representative sample enhances the credibility of the research. **Table 2** shows the profile of participants.

Table 2. Profile of participants

Variable	n	%
Sex		
Male	72	85.7
Female	12	14.3
Age		
<30	73	86.9
31-35	8	9.5
36+	3	3.6
Participation in teaching practice		
Yes	84	100.0
No	0	0.0
Number of time participated in teaching practice		
Once	0	0.0
Twice	64	76.2
Thrice	20	23.8

Instrument

The researchers collected data using a semi-structured questionnaire. The questionnaire contained open and closed ended items for participants to respond to. The closed ended items were used in generating and collecting quantitative data. It was designed using a Likert scale with a range of five options (strongly agreed-strongly disagreed). The open-ended items allowed participants to freely give their experience during the teaching practice exercise. The qualitative data generated were categorized into seven themes. The validity of the instrument was ensured by two experts in the field of teacher education and one expert in test and measurement through inter-rater method. Only test items that were certified okay by the validators were retained in the final copy of the instrument. Also, a reliability coefficient of 0.72, which was achieved by correlating the items, confirmed that the instrument was reliable enough to be used for this study.

Data Collection

The researchers used a mixed method approach to obtain data from three focus groups. After the pre-service physics teachers completed their teaching exercises, consent of the pre-service teachers was sought to take part in this study when they resumed back to the college for the continuation of 2019/2020 harmattan semester. The study did not require any official approval from the college because the teaching practice exercise is one of the compulsory courses pre-service physics teachers must pass before graduation as a professional physics teacher. 84 participants were randomly divided into three focus groups using simple ballots labelled 1, 2, and 3 and interview sessions took place for an average of two and a half hours in each of occasion. Three interview sessions (one each) were conducted in focus group. The sessions were recorded with an audio tape recorder, and it was later transcribed. The transcribed data provided data was used to analyze pre-service physics teachers experience during teaching practice.

Data Analyses

The transcribed data were analyzed into quantitative and qualitative data. Statistical package for the social sciences (SPSS) 12 was used to analyze the quantitative strand of data. This was used to prepare the frequency count and simple percentage. The qualitative strand of data was analyzed using manual coding, which was subsequently used to obtain the emerging themes. The quantitative strand of data was validated using important quotes from the qualitative strand of data. This is because the concurrent mixed method research approach allows the use of qualitative data to validate the quantitative data simultaneously. The validity and the reliability of the emerging themes was achieved by given the data to another expert in data analysis and an agreeable position was achieved for each of the themes.

RESULTS

Results from the experiences of pre-service physics teachers during teaching practice exercise is discussed here. Researchers first looked at the biographical information of the participants. **Table 2** shows the profile of the participants that took part in this study.

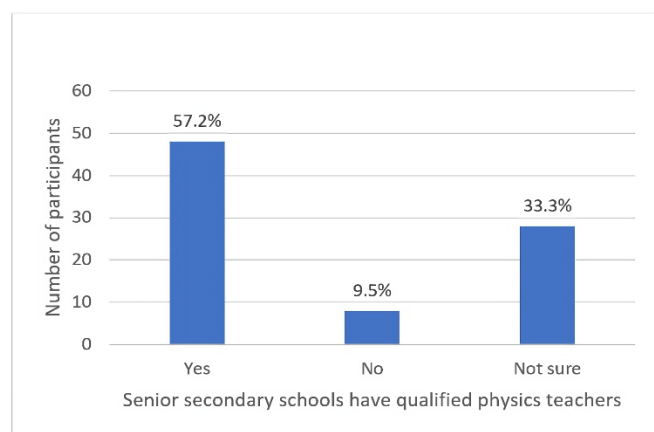
Table 2 reveals that majority of the participants were male (85.7%) while only 14.3% of the participants were female. Also, 96.9% of the participants were below 30 years of age, 9.5% were between 31 and 35 years while only 3.6% of the participants were 36 years old and above. Again, all the participants in this study participated in the 2019/2020 teaching practice exercise. About 76.2% of the participants went through teaching practice exercise twice while only 23.8% participated thrice. The minimum time required for pre-service teachers to participate in teaching practice is twice before they can graduate at the Bachelor of Education level. Participants who participated in teaching practice exercise thrice have initially registered and completed Nigeria certificate in education (NCE) program, which is a lower professional teaching qualification in Nigeria. NCE program is the minimum professional teacher qualification that individuals must attain before being allowed to teach in Nigeria. This study focused on the experiences of teachers-in-training during teaching practice in Ondo, Nigeria during 2019/2020 teaching practice exercise. To successfully answer the only question, the transcribed data collected from the interview sessions were studied, analyzed and generated into themes using NVivo software. **Table 3** shows the generated themes.

Theme 1. Physics Teachers' Qualifications

Physics teachers' qualifications was one of the major headings discussed by the participants. When asked whether secondary schools have qualified physics teachers, majority of the participants (57.2%) responded that senior secondary schools have qualified physics

Table 3. Themes generated from qualitative data

Theme	Definition
Theme 1	Physics teachers' qualifications
Theme 2	Cooperating physics teachers' mastery of the subject matter
Theme 3	Students characteristics/attitudes of senior secondary school students
Theme 4	Assessment of secondary school physics curriculum
Theme 5	Cooperation between physics teachers and school management
Theme 6	Availability of instructional materials/conduction of physics laboratory
Theme 7	Taking teaching as a profession

**Figure 1.** Availability of qualified physics teachers (Source: Authors' own elaboration)

teachers but a few of the participants (9.5%) disagreed that secondary schools have qualified teachers. At about a third of the participants (33.3%) were not sure if secondary school have qualified physics teachers (Figure 1). Qualitative data from the focus groups confirmed that secondary schools have qualified physics teachers teaching in schools. The following discussion with participants illustrates some of the findings.

PPT₁: Yes, fewer number of people go into teaching profession after studying physics in university. Some prefer teaching other subjects other than physics, so the fewer number teaching physics always put their best in it.

PPS₄: With my experience during TP, I can see that they have qualified physics teachers.

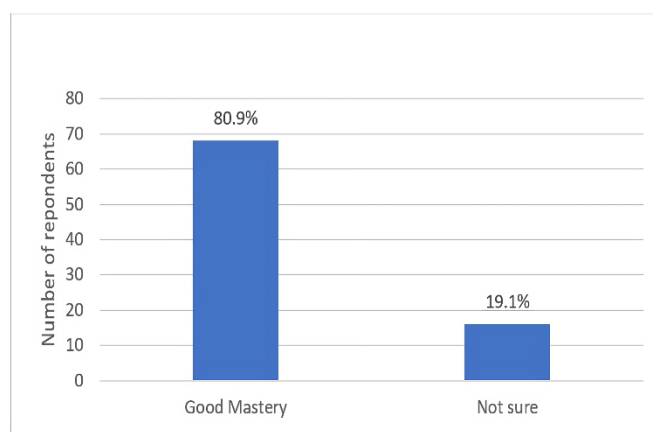
PPT₆: Yes because I work with intelligent man.

PPT₁₆: They have qualified physics teacher because the teachers are well experienced in the subject matter.

PPT₁₇: With my view and what I experienced during my T.P. exercise, the two physics teachers in the secondary school that I observed my TP are qualified physics teachers.

Theme 2. Cooperating Physics Teachers' Mastery of the Subject Matter

Physics teachers are expected to be professional qualified and also have adequate mastery of the subject

**Figure 2.** Physics teachers' mastery of the subject (Source: Authors' own elaboration)

matter. Majority of the participants (80.9%) agreed that physics teachers teaching in secondary schools have good mastery of physics. Only a small fraction of the participants (19.1%) were not sure if senior secondary school physics teachers have good mastery of physics (Figure 2). Findings from the qualitative strand of data further confirmed the experiences of the participants that secondary school physics teachers have good mastery of the subject.

PPT₁: Yes, he has a good mastery ... Anytime he is in class while a student teacher is teaching, he helps by explaining better to students.

PPT₃: Yes they have good mastery of the subject matter, whenever I want to take a topic and I need clarification I will have to go to them for more explanation before going to teach the students.

PPT₅: To a large extent, he has mastery of subject because of his method adopted in teaching physics is extraordinarily, which shows how good he is, but he was the only one taking physics in that school.

PPT₇: He really has good mastery of the subject, but the workload is too much for him alone ... he was the only physics teacher in that school.

PPT₈: Yes he has good mastery of subject because he employed the use of some instructional strategies, material and some educational gadgets that makes teaching easier.

Table 4. Students' characteristics (n [%])

Students characteristics	SA	A	NS	D	SD
Senior secondary school students have poor attitude to physics.	-	16 (19.1)	56 (66.6)	12 (14.3)	-
Peer pressure affects secondary school students' performance in physics.	-	58 (69.0)	10 (12.0)	16 (19.0)	-
Teaching practice school practice corporal punishment.	4 (4.8)	24 (28.6)	40 (47.6)	8 (9.5)	8 (9.5)

Note. SA: Strongly agree; A: Agree; NS: Not sure; D: Disagree; & SD: Strongly disagree

Table 5. Assessment of physics curriculum (n [%])

Students characteristics	SA	A	NS	D	SD
Senior secondary school physics curriculum is difficult.	-	12 (14.3)	44 (52.4)	12 (14.3)	16 (19.0)
Students feels the senior secondary curriculum is easy.	8 (9.5)	8 (9.5)	44 (52.4)	12 (14.3)	12 (14.3)
Senior secondary school physics curriculum is complex in nature.	-	20 (23.8)	32 (38.1)	20 (23.8)	12 (14.3)

Note. SA: Strongly agree; A: Agree; NS: Not sure; D: Disagree; & SD: Strongly disagree

PPT₁₇/PPT₁₈: Yes she has a good mastery of the subject. She teaches the students with relevant materials for better understanding of the learners.

PPT₁₂: When students see their friends going for a particular subject, they too want to join so as not to lose friendship.

Theme 3. Students' Characteristics/Attitudes

Student's attitudes play a major role to the success recorded during physics lessons. When asked about the attitudes of secondary school students to physics, most of the participants (66.6%) were not sure of student's attitude to physics. Only about one fifth (19.1%) of participants responded that students have poor attitudes towards physics while 14.3% of them responded that students have good attitude toward physics (Table 4).

Even though most of the participants were not sure whether students have poor attitude to physics, the qualitative data reveals that some of the participants agreed that secondary school students have poor attitude towards physics.

PPT₁: Some felt physics is a difficult subject.

PPT₅: They see physics as difficult subject due to lack of adequate teaching personnel and facilities.

PPT₇: They do not normally have a full interest in physics due to lack of encouragement from the teachers.

Peer pressure is another characteristic highlighted under students' characteristics. More than half of the participants (69.0%) agreed that peer pressure affects students' performance in physics. Only 19.0% of the participants do not agree that peer pressure affect students' performance in physics (Table 4). The qualitative data also supported this claim.

PPT₄: Yes, it is true ... Some students choose science because of their friend's decision, which may not be good enough.

PPT₆: Yes because some copy their friends.

PPT₁₀: Yes, not all students are interested in calculating with their brain.

PPT₁₉/PPT₂₀: Yes because they do not know the specific department of their choice.

The researchers also looked out for whether teaching practice school engage in the practice of using corporal punishment or not. This might go a long way in determining student's attitudes to physics. Almost half of the participants (47,6%) were not sure whether the school used corporal punishment. About 33.4% of the participants agreed that schools practice the use of corporal punishment while 19.0% of the participants disagreed that schools used corporal punishment on the students (Table 3).

Theme 4. Assessment of Secondary School Physics Curriculum

The secondary school physics curriculum specifies the contents to be taught and learnt by the teachers and students respectively. The official document is usually published by Nigeria Education Research and Development Council (NERDC).

The last curriculum review in physics took effect in the year 2009 (NERDC, 2018) and a new theme was added to the curriculum. When asked about their assessment of the physics curriculum, more than half of the participants (52.4%) were not sure if curriculum was difficult. About a third of participants (33.3%) disagreed that senior secondary school physics curriculum is difficult but only 14.3% of participants agreed that curriculum was difficult (Table 5).

In a similar version, 28.6% of participants disagreed that secondary school students feel the secondary school physics curriculum was easy. Only 19.0% of participants agreed that secondary school physics curriculum was easy. Qualitative strand of data reveals that even though most of participants were not sure whether senior secondary school physics curriculum was difficult or easy, a number of participants have divided views.

Table 6. Availability of infrastructures/laboratory (n [%])

Students characteristics	SA	A	NS	D	SD
Teaching practice school has physics laboratory.	68 (80.9)	-	-	16 (19.1)	-
Teaching practice school conducts physics practical classes.	48 (57.2)	-	8 (9.5)	-	28 (33.3)
Teaching practice school has adequate infrastructural facilities.	4 (4.8)	16 (19.1)	28 (33.3)	28 (33.3)	8 (9.5)

Note. SA: Strongly agree; A: Agree; NS: Not sure; D: Disagree; & SD: Strongly disagree

PPT₈: The students feel very easy in understanding the subject matter in each theme of physics curriculum.

PPT₁₂: The curriculum is not effective without practical. The subject is not real to them except they get their hands on practical. More so they do not have a basic knowledge of it, and it prevents them to grasp the whole concept of the subject.

PPT₁₇: Senior secondary school students feels physics curriculum is hard but with the help of qualified physics teachers they were able to gain their interest in learning the subject.

Table 5 also shows that 38.1% of the participants disagreed that the senior secondary school physics curriculum is complex in nature while only 23.8% of the participants agreed that the curriculum is complex in nature. The qualitative data reveals that participants are divided in their opinion whether the curriculum is complex in nature.

PPT₅: Not that complex but the method adopted by various secondary school teachers in teaching physics makes it seems so. Teachers should use more friendly methods.

PPT₁₁: As a result of inadequate training on practical it makes physics look difficult to them.

PPT₁₇: Yes, it is complex because there is not enough equipment to aid the teaching of physics in senior secondary school.

Theme 5. Cooperation Between Physics Teachers and School Management

Participants shared their experience on the level of cooperation between physics teachers and the school management during their teaching practice exercise. The kind of leadership and support given to physics teachers have the tendency to determine the success level that will be recorded during teaching and learning. The participants have the following to say.

PPT₁: Yes, the management provides necessary support.

PPT₂: The level of cooperation is highly low and not encouraging for their level of interest shown to the aspect of physics.

PPT₁₂: Yes, to some extent, the management give necessary support.

PPT₁₅: Management does not provide necessary support for the study of physics.

PPT₁₇: They have a good cooperation because students enjoy physics when there is a qualified teacher teaching them.

Theme 6. Availability of Instructional Materials/Conduction of Physics Laboratory

Physics, an integral part of science relies greatly on practical for its adequate teaching and learning. The availability of instructional materials and laboratories can go a long way in achieving the objectives of teaching. **Table 6** shows that 80.9% of the respondents agreed that senior secondary schools have physics laboratories for conducting practices but only 19.1% of the participants disagreed that schools have laboratories. In almost the same manner, more than half of the participants (57.2%) agreed that senior secondary schools had physics practical classes but 33.3% disagreed that schools had practical classes.

Table 6 also reveal that 23.9% of the participants agreed that secondary schools have adequate infrastructural facilities but 42.8% of the participants did not agree that schools have adequate infrastructural facilities for teaching physics. More than half of the participants (52.4%) did not agree that schools have overcrowded physics classes but only 28.6% agreed that schools have overcrowded physics classes. The qualitative strand of data confirmed that secondary schools have laboratories, but the equipment are not of standard and adequate. Some of the participants have these to say.

PPT₁: Yes, but no standard equipment.

PPT₄: Yes but not standard.

PPT₅: Yes but lacked necessary teaching equipment.

PPT₈: Yes not standard but still preferable

PPT₁₂: They do not have adequate infrastructures because government is not supporting the school as it should.

PPT₁₅: Yes, they have but not standard at all.

Table 7. Taking teaching as profession (n [%])

Students characteristics	SA	A	NS	D	SD
I am willing to take up teaching as a profession.	68 (80.9)	-	-	-	16 (19.1)
I enjoyed my training to become a professional physics teacher.	72 (85.7)	-	-	-	12 (14.3)

Note. SA: Strongly agree; A: Agree; NS: Not sure; D: Disagree; & SD: Strongly disagree

PPT₁₇: It does not have enough equipment.

PPT₂₁: They have a tarded building I cannot call a laboratory.

The consensus is that secondary schools do not have adequate infrastructural equipment to conduct physics practical classes. The participants agreed that even when some schools have physics laboratory, the laboratory was not equipped to standard.

Theme 7. Teaching as a Profession

Teaching is a profession that engages in the continuous training of its practitioners. When asked if they would be willing to take up teaching as a profession, most of the participants (80.9%) agreed to take up teaching as a profession but only 19.1% of the participants were not willing to take up teaching as a profession (Table 7). Again, 85.7% of the participants agreed that they enjoyed their training to become a professional teacher, but a fraction of the participants (14.3%) did not agree that they enjoyed their teacher training program. The qualitative data supported the quantitative data. Participants went further to give reasons why they would love to take up teaching as a profession.

PPT₁: Yes, so as to improve students' performance in physics and also to fill the gap of inadequacy and lack of qualified teachers in our secondary schools.

PPT₁₁: Yes I would like to take up teaching appointment as a physics teacher after graduation in order to disseminate sound attitude towards the learning of physics to the upcoming generation.

PPT₁₉: Yes so that I will not forget what I gained in school and my education will not be useless.

A few participants also gave reasons why they are not considering taking up teaching appointment. Some of these reasons are due to the incapability to teach the subject as expressed by one of the participants.

PPT₁₂: No, I do not think I can handle it... I do not have enough knowledge to pass on the physics students.

PPT₂₁: No, I would have loved too but the political policies in place are poor coupled with most of the lecturers who taught us do not have good mastery

of what they teach. Others are frustrated because of poor salary.

DISCUSSION

The result that emanated from this study is considered apt because pre-service teachers experience of teaching practice can influence the type of teacher they would become in the nearest future. Pre-service physics teachers also evaluated some aspect of the teaching-learning process based on their experience during the teaching practice exercise. Students' evaluation of instruction has been argued to be valid enough to take useful decisions during the teaching-learning process (Aleamoni, 1987; Remmers, 1928) even though Stroebe (2020) argues that university students' evaluation of teaching cannot be totally trusted because its validity is yet to be empirically justified in literature. Therefore, the result provides empirical proof of the availability of qualified physics teachers in secondary schools in Ondo, Nigeria. Both the quantitative and qualitative strands of data allured to the availability of qualified teachers. The result emanating from this study agrees with Akinbobola and Bada (2019) who reported that there were qualified secondary school physics teachers in public schools in Ondo. However, this investigation disagrees with the position made by John (2019), who reported that secondary school lacked qualified physical science teachers in eastern cape rural school. The difference in the result might be because of the site difference as the two studies were carried out in different localities. The findings from the study also emphasized teachers' professionalism to the profession. The result emanating from theme 2 reveals that a large proportion of the respondents agreed that physics teachers within the geographical scope of this study have good mastery of the subject. This result agrees with the finding obtained by Nwona and Madu (2018). In their study, they found out that physics teachers in Kogi Central have good mastery of the subject. The availability of professionally trained physics teachers can signify better achievement in students grades in both internal and external examinations in physics. However, John (2019) in his investigation disagrees with the availability of professionally trained physics teachers. The researcher argues that physical science teachers do not have good content knowledge of the subject. This investigation was however silent on physics students' attitudes towards physics as most of the respondents were neutral on secondary school students' attitude to physics. However, few of the respondents opine that physics students have poor attitudes to physics. This result

agrees with John (2019) who found out physical science students in eastern cape have poor attitudes to the study of chemistry and physics. The finding from this investigation makes a strong case that cooperation exist between physics teachers and the school management. Useful quotes from the qualitative strand of data argues that physics teachers received adequate support from their school management. This result agrees with the findings of John (2019) and Kiggundu and Nayimuli (2009) who found out that cooperation exist between physical science teachers and other stakeholders in the school. On the availability of instructional materials and resources, the findings reveal an inadequate supply of resources for teaching senior secondary school physics. Despite the availability of physics laboratory, empirical evidence from this study showed that the laboratories were not equipped with the required materials and resources. This finding agrees with literature especially on the inadequate resources available for teaching physical science. This result agrees with John (2019) who found out that poor infrastructures and material resources exist in secondary school thus posing a hinderance to the effective teaching of physical science (chemistry and physics). The finding from the study also agrees with Akinbobola and Bada (2019) and Bada and Jita (2021) who found out that inadequate facilities such as laboratory and e-learning facilities were not readily available for use during the teaching of secondary school physics respectively.

CONCLUSIONS

To conclude, this study aimed to assess the experiences of pre-service physics teachers during teaching practice. Findings from this study indicate that secondary schools in Ondo have qualified physics teachers. This suggest that secondary school teachers have good mastery of the subject, and they have the capacity to ensure the effective teaching of the subject hence realizing the objectives for teaching physics. This also suggest that a relatively good teacher education program was in place because teacher education program is expected to aim at producing qualified teachers who have good mastery of the different subject. The finding argues that the goal of teacher education programs is to provide for the development of pre-service teachers' knowledge of content, pedagogy and pedagogical content to foster their teaching skills in real classroom situations. The result from this investigation reveals that peer pressure and students attitude affects the achievement of students in physics. The secondary school physics curriculum was also found not to be difficult for the students and by the pre-service physics teachers. Students also believed that the physics curriculum was not complex in nature. This buttresses the fact that the curriculum was realistic because its objectives can be realized. Findings revealed that secondary schools have laboratories even though they

are not having adequate equipment, but schools were still able to conduct practical classes. The results from this investigation also revealed that student physics teachers enjoyed their professional teacher training program and are ready and willing to take up teaching as a profession. The experiences of teachers in training during their teaching practice can go a long way in determining the experience they take to the profession. Therefore, the practical teaching provided to pre-service teachers has the capacity to equip them with the pedagogies, skills and competences that they require to effectively discharge their duties in the profession.

Recommendations

Based on the results from this study, we consider the following recommendations appropriate for scholarship in the teaching and learning of senior secondary school physics.

1. Efforts should be put in place to sustain the professional teacher training program to guarantee the continuous recruitment of qualified physics teachers to teach secondary school physics teachers.
2. Effective and professional teacher training program should be always ensured for pre-service teachers to have good mastery of the subject matter.
3. Efforts should be made to improve secondary school students' attitudes to physics through the use of more innovative teaching methods that have the tendency to improve student's attitudes towards the subject.
4. Peer pressure among students should be closely monitored to have alleviate the negative tendencies that might spring up among the students.
5. More concrete steps should be made to improve on the inadequacy and non-availability of equipment, materials and resources needed for teaching secondary school physics either by the government and its agencies or other agencies of education.

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happenings during teaching practice. The pre-service teachers used in the sample freely consented to the part of the study.

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