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A COMPARATIVE PERSPECTIVE OF TEACHING SKILL ACQUISITION IN PRE-SERVICE PHYSICS TEACHER (PSPT) TRAINING PROGRAM IN CHINA AND NIGERIA

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Abstract. *Microteaching practice is an important part of Pre-Service Physics Teacher (PsPT) Training Program adopting different approaches to inspire the acquisition of teaching skills by prospective teachers. Using psychomotor domain aspect of revised Bloom's taxonomy to explore microteaching practice as it relates to physics teaching, this research examined the significant influences of the two approaches (Nigeria and China) identified on the teaching skill of PsPT and suggests the best ways of improving the teaching skill of PsPT through micro-teaching practices. Data were collected using the mixed-method research design of administering descriptive survey questionnaire on final year PsPT while a structured interview question was used to interview the teachers. It was found that the two approaches had significant influences on the teaching skill acquisition of PsPT through microteaching practices with respect to physics as a subject that requires motor skill, and that this can be improved through micro-teaching by a combination of theory with practice. Also, physics teacher educators need to focus on developing PsPTs' psychomotor domain in line with time reform in microteaching practices to accommodate more time for PsPTs' to master the subject concept of physics as a psycho motive subject.*

Keywords: *micro-teaching practices, pre-service physics teacher, teaching skill acquisition, training program.*

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Introduction

Teaching skills are essential skills that need to be acquired during the teacher training program. However, due to different cultural contexts and approaches, the acquisition of this skill can be achieved through various patterns. Many teacher preparation programs prioritize the development of cultural readiness needed and teachers have a pivotal role for supporting learners in their classrooms to engage with diverse cultural values, beliefs, and norms of behaviors that are not in agreement with the experiences of learners (Arthur et al., 2020). It appears training programs vary from countries to countries; cultural background to another; regions to regions even geographical location to others, unlike teacher training microteaching practices program which has been observed in various studies to be the same process everywhere. Microteaching, as a concept, is designed to develop the teaching method and cannot stand alone (Mahmud & Rawshon, 2013). For instance, in Chinese teacher education program, microteaching is seen and taught as a separate course and as a methodology, which might be the reason for higher performance in Program for International Student Assessment (PISA) (Amy, 2019; Lau & Ho, 2016; Wei & Ou, 2018). Meanwhile, the Nigeria cumulative performance in West African Examination Secondary School Certificate Examination (WASSCE) stands at about 47% in Physics (Gulee et al., 2018) and teacher factor has been associated with poor performances in WASSCE (Ogundele et al., 2014).

The first microteaching started at Stanford University in the United States of America in 1959 and was applied by the faculty members of

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the institution. Allen (1980) in his personal review on microteaching defined it as a vehicle of instructional development to test different format of instruction and presentation. According to him, microteaching can be used at different levels.

Microteaching has been described as a vehicle for the pre-service teachers' professional development, as a tool for reflection, and a training technique that can be employed to develop skills (Cebeci, 2016; Golightly, 2010). Microteaching is used to develop skills which are directly related to psychomotor domain aspect of revised Bloom's taxonomy in physics, and study has shown that this part of learning domain addressing mathematics and mathematics-related subjects has been neglected for long (Egereonu, 2010). On the other hand, a research carried out in Central China Normal University Wuhan, submitted that the deficiency of microteaching practices is being artificial, which to some extent, limits the student teachers' development in real-life classroom teaching competence. The research further suggested that microteaching should be supplemented with various alternative forms of school experience and practices (He & Yan, 2011). Against this backdrop, this research seeks to compare the influence of microteaching approaches on pre-service Physics teacher in a country other than China where studies have supported the use of microteaching practices as a means to acquiring teaching skills in teacher training programs and probe into new ways to improve teaching skill through microteaching.

Theoretical Framework

Acquisition of teaching skill by PsPT adheres to the principle of Psychomotor domain which is one of the three domains in Bloom's taxonomy originating from Bloom in 1956 and later revised to add relevance to the 21st century students and teachers (Bloom & Krathwohl, 1956) . In the revised version of Bloom's taxonomy, excluding the affective and cognitive domains, Psychomotor domain illustrates learning related to actions and motor skills (Thomas, 2004, p.1). Action and motor skills implies that any learner needs to be an active participant recipient of an information (Yan &Yang, 2019) which could be explored in any profession to acquire skill practices (Roush, 2008). Physics as a subject requires motor skill, for instance PsPT learns how to connect electric circuit or simple pendulum experiment and for an effective learning of this task, the training of PsPT must entail psychomotor phenomena. Since the context of this study deals with acquiring skill in class processes phenomena', understanding the concept of Physics (i.e., elements of motion) as related to psychomotor domain will help the PsPT master the needful class process teaching skills. In learning and teaching physics concept, element of psychomotor domain cannot be neglected. Egereonu (2010) in his study explained how this aspect of educational learning domain has been neglected in mathematics and mathematics- related subjects which he further validated the use of psychomotor in mathematical concept.

Researchers have applied the cognitive domain aspect of revised version of Bloom's taxonomy to compare the curriculum standards in Mainland China, Taiwan, Hong Kong and Macao (Wei & Ou, 2018). Ramma et al. (2017) explored teaching and learning physics using technology: making a case for the affective domain. Similarly, Harun et al. (2018) applied the effectiveness of cognitive and psychomotor domain of culinary art students' performance after internship in private colleges. However, little or no attention was given by the researcher on the application of psychomotor domain to acquire teaching skill by the prospective physics teachers. The Specific considerations were made for pre-service physics teacher to acquire teaching skill within two learning approaches which is characterized by learning basic procedures (class process i.e., learn to; plan a lesson plan, introduce the lesson, presentation of the lesson and conclusion of the lesson). In this research, acquisition of teaching skill by the PsPT which was based on two learning approaches in China and Nigeria was explored. These approaches can be achieved through learning basics class process procedures. By applying the elements and procedure through extensive repetition in microteaching practices, it might enhance the PsPT ability to apply the principles learnt in the process to acquire the teaching skills as shown in Figure 1.

Micro-teaching is one of the needful practices in the training of prospective teachers. As the name implies, it means teaching processes that require a very small group of participants. As a teaching technique, microteaching can be used for various types of professional development. It has afforded a successful and an interesting method for transferring theory into practice for pre-service teachers in a teacher's education program as supported by Mergler and Tangen (2010) work that elements of microteaching process are the skills of being able to implement theory into practice through a lesson, giving and receiving feedback and engaging in self-reflection. The training cycle of microteaching incorporates fewer students and takes less

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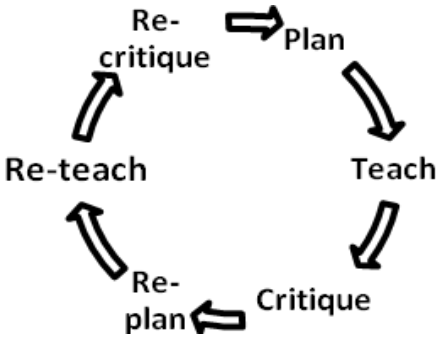
time. The cycle consists of the following stages: plan, teach, critique, re-plan, re-teach and re-critique (Khamari et al., 2013). In order to train prospective teachers who can implement theory into practice, it is imperative to add the element of microteaching into PsPT program

Figure 1
Repetition flow diagram of microteaching practices



Overview of Microteaching Practices

One major objective of the microteaching application is to develop skills through repetition (i.e., re-plan, re-teach and re-critique) procedures in teaching in pre-service Physics teacher. The process is in cyclic form, as supported by Benton (2001) and cited by Bakir (2014) whereby student's presentation is recorded with a video camera and watched by the candidate, supervising instructor and the classmates without any editing. First critiques which guide the candidate to re-prepare the lesson plan and re-present it to the same group are provided after the viewing. The Second presentation is recorded as well and watched with the same group consisting of self, supervising instructor and classmates. The second viewing is followed by another critique session that focuses on the performance of the teacher's candidate.

Stages in microteaching as reviewed and cited in Özcan and Gerçek (2019) consist of five stages: decision-making stage, planning stage, application stage, evaluation stage, and development stage. Arsal (2014) pin-pointed classroom realities, efficient, communication skill and self-confidence as benefits of microteaching to the pre-service teacher education and these were supported by various literature. Microteaching also serves to bridge the gap between teacher preparation and classroom practices (Ostrosky et al, 2012). Also as teaching preparation needs to be monitored by the teacher educators, microteaching affords a place of preparation for the teaching profession because of its potential to emphasize the relationship between theory and practice and transition from theory to real teaching situations (Koross, 2016; Ostrosky et al., 2012; Yasemin, 2016).

Apart from the numerous advantages of microteaching, work cited in Yan and He (2017) by different researchers have enlisted contrary views about microteaching practices and they include being stressful, artificial in nature and time consuming (Bell, 2007; Collins & Ting, 2010). Artificial nature of microteaching was described by Cebeci (2016) as a practical training technique provided by prospective teachers which can develop their teaching style outside the real classroom experiences.

Thus, from the above critical analysis of kinds of literature on stages in microteaching approach, it was found that microteaching practice was treated in a cyclic form without any theoretical backup, also the peculiarity of physics concept as it's related to motor skill during microteaching has also been neglected. Moreover, many researchers had revealed the positive impact and benefits of microteaching to the pre-service teacher education, but stressful nature and artificial form of microteaching have been identified as potential shortcomings. Furthermore, the international comparative research context on microteaching approaches is un-identifiable.

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Importance of Teaching Skill Acquisition in Pre-service Physics Program

Teaching skill is a needful skill to acquire during the training processes of pre-service Physics teacher education program. The question is what is teaching skill and how can a prospective teacher acquire the skills? This is important as it was revealed that learning how to teach is a major challenge of most pre-service teachers (Shaughnessy & Boerst, 2018). Although, it was shown in Choy et al. (2012) on a confirmatory factor analytic approach on perceptions of knowledge and skills in teaching that novice teacher is expected to have some basic pedagogical knowledge and skills. It means that pre-service teachers as a novice in teacher education program context must have in one way or the other acquired some basic knowledge about their subject matter and left to grasp and acquire the needful skills during their teacher training program.

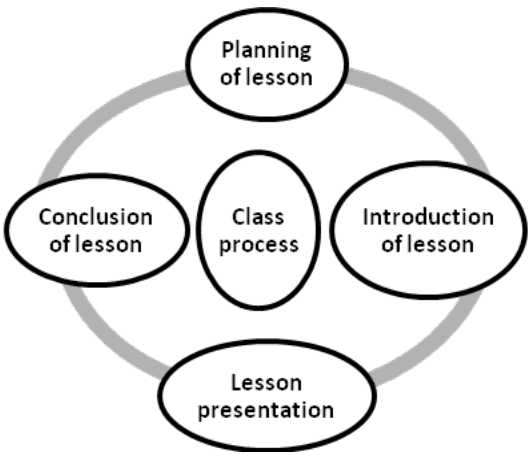
Prospective teachers need to be well trained by the teacher educators as teachers' skill is used in detecting and identifying effective classroom interactions that may be useful for teacher's preparation and training (Jamil et al., 2015), which have a strong impact on student's academic emotional experiences as cited in Muntaner-Mas et al. (2017).

The peculiarity of science courses in the pre-service teacher training program as a course of study needs some close monitoring by their teacher educators. Kadbey and Dickson (2014) study revealed the true state of internships or teaching practice in PSTs program. Effective mentoring was highlighted as a key factor in part of teacher educator, which goes a long way to impact teaching and acquiring needful teaching skill in science pre-service teacher training program.

In preparing and training pre-service teachers, microteaching, as explained by Donnelly and Fitzmaurice (2011), helps students to gain insights into their lesson and become engaged in more reflective practices as one of the meaningful ways to acquire teaching skills. Moreover, Albhnsawy and Aliweh (2016) work gives insight into the process of microteaching by using blended learning program on student teachers' teaching skills in an undergraduate microteaching course and the result revealed that blended learning has a significant effect on the participants' teaching skills.

Understanding the concept of teaching skill that can be acquired through classroom process in microteaching as conceptual analyses of this study is shown in Figure 2.

Figure 2
Stages in class process



Watson and Watson (2006) concluded that novice teachers expressed concerns about their perceived lack of preparation for dealing with classroom problems, the question now is how can a pre-service teacher *plan, introduce, present and conclude* his/her lesson? Nilsson (2009) suggested that their pedagogical reasoning, all pre-service teachers should stress the need for good content knowledge to feel more confident in the classroom and knowing how to explain phenomena to their students. The pre-service teachers also should emphasize the need to put scientific

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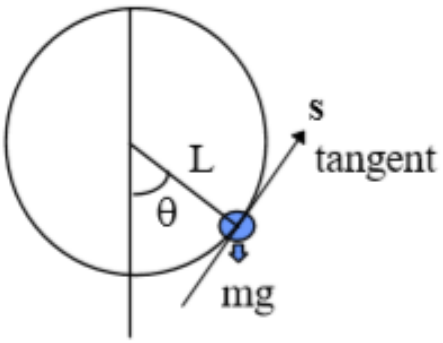
concepts into an everyday situation for their pupils, so that they might better understand different phenomena, and they should emphasize the need for having a large repertoire of experiments and activities which are psycho motive in nature. Majority of the pre-service teachers should emphasize their intentions of explaining phenomena and beginning to recognize the problematic nature of teaching. For instance, PsPT is required to prepare a lesson note to teach during training classes, he/she is to teach Simple Harmonic Motion (SHM) as a topic. In order to teach such a topic, PsPT needs to specify the objectives of the lesson. If, for instance, the objectives of the lesson are to define and explain SHM with examples: Taking simple pendulum as an example of SHM. The teacher could only effectively teach this after he/she must have learnt and mastered how this experiment works, that is its psycho motive nature (force action and motion) which is the principle that guides the theorem as shown in figure 3, with the mathematical equations depicted in Eq. (1 to 6). These explain that the display should be done in a small angle to avoid conical oscillation, but a novice teacher cannot understand this concept. There is thus the need for the novice teacher to master this procedure through repetition on how to displace this ball through a small angle in other to get accurate results of the readings.

Figure 3
Showing the small displacement of simple pendulum bob



By applying, Newton's second law equation of motion (Zimba, 2009, p.247) for the simple pendulum

$$\frac{d^2S}{dt^2} = \mathrm{L}\frac{d^2\theta}{dt^2} = -gsin\theta \quad (1)$$

Where L is length of the string which is equal to radius r of the circle, $\theta\theta$ is the angular displacement pendulum bob, S is tangential line to arc $\theta\theta$, M is mass of the pendulum bob, $-gsin\theta - gsin\theta$ is the acceleration due to gravity in S direction. The angular acceleration $\theta\theta$ is for small angular displacement is $\sin\theta \approx \theta \sin\theta \approx \theta$; thus the Eq. (1) can be written as:

$$\frac{d^2\theta}{dt^2} = -\frac{g}{L}\theta \quad (2)$$

Eq. (2) is the linear form of Eq. (1)

$$\omega^2 = \frac{g}{l} \quad (2a)$$

Substituting Eq. (2a) into Eq. (2), it then becomes

$$\frac{d^2\theta}{dt^2} = -\omega^2\theta \quad (3)$$

Eq. (3) is well known as simple harmonic motion (SHM) equation, whose solution is given as

$$\theta(t) = A\sin(\omega t) + B\cos(\omega) \quad (4)$$

Since A and B are constants, the Eq. (4) can be written as shown in Eq. (5) using trigonometric identity

$$\theta(t) = a_{max}\sin(\omega t + \emptyset) \quad (5)$$

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Differenting Eq. (5) with respect to time (t)

$$\frac{d\theta}{dt} = a_{max}\omega\cos(\omega t + \emptyset) \quad (6)$$

Where a_{max} is the amplitude of oscillation – is the initial phase constant

Seeing through the eyes of the pre-service teacher Chen and Pamela (2017) noted that "*Evaluation of pre-service teacher performance may reflect a replay of their own teacher training and unintentionally perpetuate practices of the past, whereby beginning teachers are legitimately instilled into a homogeny of practice"(p.14).*

The real process whereby training of PsPT can be done is during the teacher training program of which microteaching practice is a subset. As earlier explained by different researchers, one of the needful practices in the training of prospective teachers is microteaching practices. In this regard, teacher educators have direct contact and impact on the Physics pre-service students to master the teaching skill through psychomotor domain context. Hence, different approaches to microteaching practices were required to compare the significant influences of teaching skill acquisition of PsPT program.

Research Focus

This research aimed to compare the significant influences of the two approaches of the microteaching practices on teaching skills acquisition and possible ways to improve teaching skill through microteaching practices in PsPT training program. The approaches to the training of PsPT are very crucial since, at this stage, PsPT are required to acquire teaching skills. Thus, the context of this research critically looks into the two approaches, how it can improve the acquisition of PsPT teaching skills through microteaching practice and illustrate physics as a subject that requires motor skill which is a psycho motive in nature as it relates to microteaching practice. In this present research, Nigeria approach entails microteaching practices as just part of teaching methodology (Physics Method) while in the Chinese approach microteaching practices stand for the teaching methodology.

The research questions and hypotheses were as follows:

1. Which of the approaches of microteaching has a higher influence on teaching skill of pre-service Physics teacher?
2. What are the ways to improve teaching skill through microteaching?

Research Hypotheses

1. There is no significant difference in the influence of micro-teaching practice on lesson plan of pre-service physics teachers in China and Nigeria.
2. There is no significant difference in the influence of micro-teaching practice on introduction of lesson of pre-service physics teachers in China and Nigeria.
3. There is no significant difference in the influence of micro-teaching practice on lesson presentation of pre-service physics teachers in China and Nigeria.
4. There is no significant difference in the influence of micro-teaching practice on conclusion of lesson of pre-service physics teachers in China and Nigeria.

Research Methodology

General Background

Micro-teaching practice has been used for pre-service teachers' professional development, training and sharpening of skills (Cebeci, 2016; Essam, 2003; Golightly, 2010). However, He and Yan 2011 reported that micro-teaching practice limited pre-service teacher's development and competence in real-life classroom. There are numerous teaching skills that PsPT can acquire from micro-teaching such as communication, class

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management, class process, multi-tasking, teamwork, amongst others. This research, however, focused on class process (as shown in Figure 2) as one of the teaching skills. As this process is being accomplished through microteaching practice we look at the peculiarity of physics as a subject that requires a motor skill (psycho motive domain) of which little or no research has been previously explored (Egereonu, 2010). Psychomotor domain, which is one of the three domains in Bloom's taxonomy requires the mastering of the desirable skill that can lead to skillfulness or competence of such skill in real-life experience and practices. The research was carried out with final year PsPT of Zhejiang Normal University in Zhejiang Province of China and Tai Solarin University of Education in Ogun State, Nigeria for 2018/2019 academic session. The data were collected for a full semester spanning from February to June 2019.

Participants

The population for the research comprised of 96 final year PsPT, two Physics teacher educators from Zhejiang Normal University, Jinhua, Zhejiang Province, China, and 50 final year PsPT with three Physics teacher educators of Tai Solarin University of Education, Ijebu-Ode, Ogun State, Nigeria. The research sample consisted of 27 PsPT and one PsPT educator from ZJNU and 33 PsPT and one PsPT educator from TASUED were selected by adopted purposive and random sampling techniques. Purposive sampling is defined as sampling selection that is based on the researcher judgment (criteria) that will best provide an answer to the research objective, and random sampling is a homogenous sampling that each or every element of the population has an equal chance of being included in the sample (Etikan & Bala, 2017). In China, ZJNU was purposively selected because it has a centre for training teachers; Teacher Education Practical Training Centre (TEPTC). The TEPTC was set up for the acquisition of teaching skills through micro-teaching and it recently attracted international recognition for hosting the 3rd edition of Africa-China World Education Partnership Forum on Teacher Education which was sponsored by World Bank (Africa-China-World Bank Education Partnership Forum, 2019). In Nigeria on the other hand, TASUED was purposively selected because it is a specialized University of Education and microteaching is incorporated as part of the teaching methodology (Physics method course). Since participation in the data collection process should be voluntary (Šorgo & Špernjak, 2020), thus involuntary PsPT were omitted in the random selection of the sample. Besides, the number of research samples represented approximately one-third of the total population, therefore the sample size is sufficient to represent the total population.

Instrumentation

The following instruments were used in the research:

- PsPT Class Process Questionnaire (English and Chinese version)
- Micro-teaching Improvement Interview Schedule (English and Chinese version)

PsPT Class Process Questionnaire

The questionnaire was constructed by the researchers and administered on PsPT in China and Nigeria. The questionnaire consists of two sections: A and B. Section A sought for information on respondents' personal data while section B had four parts; I, II, III and IV. Part I sought information on the influence of micro-teaching practice on the lesson plan of pre-service Physics teachers. Part II sought information on the influence of micro-teaching practice on the introduction of the lesson of pre-service Physics teachers. Part III sought information on the influence of micro-teaching practices on the lesson presentation of pre-service Physics teachers. Part IV sought information on the influence of micro-teaching practices on the conclusion of the lesson of pre-service Physics teachers. There were a total of 27 items in part B and the response formats, ranging from strongly agree, agree, disagree and strongly disagree. The questionnaire was translated into Chinese version for it to be administered on the Chinese participants. The questionnaire was trial tested on some students in equivalent schools in both Nigeria and China and the Cronbach alpha coefficient gotten

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was .82 and .91 respectively, which is greater than the acceptable threshold of (.6) cited in Zhu et al. (2019). The reliability coefficient was to ensure that the scale was internally consistent which implies that the PsPT Class Process Questionnaire was reliable.

Micro-teaching Improvement Interview Schedule

The interview schedule was developed by the researchers and administered on PsPT educators. There were a total of 5 items on the interview schedule asking about the problems and ways to improve micro-teaching. It was given to two experts in qualitative research to give their advice and contributions to the questions raised in the interview schedule. Their contributions were used in improving the interview schedule. The interview schedule was translated into Chinese version for it to be administered on the Chinese educator.

Procedure for Data Collection: For the PsPT

Quantitative data were collected using the PsPT Class Process Questionnaire. The questionnaire was administered on PsPT in China and Nigeria during the 2018/2019 academic session spanning from February to June 2019. In China, the PsPT had undergone 11 classes of microteaching practice and were prepared to go for internship. The researchers were able to meet with 27 pre-service Physics teachers at ZJNU who responded to the Chinese version of the questionnaire. In Nigeria, the PsPT had completed the teaching methodology classes and were prepared for teaching practice, an arrangement was made by the researchers with a research assistant, and the English version of the questionnaire was sent via email to the research assistant. Fifty (50) questionnaires were printed and administered to the students and forty (40) out of the fifty (50) sent out were harvested back. All filled questionnaires were scanned by the research assistant and sent back to the researcher. Thirty-three (33) questionnaires were found valid and used by the researchers.

Procedure for Data Collection: For the Teacher Educators

Qualitative data were collected using the Micro-teaching Improvement Interview Schedule. The interview schedule was translated to Chinese in order to be used in interviewing with the Chinese educator at (ZJNU). The audio was recorded which was transcribed into English. In Nigeria, the interview was conducted with the educator at TASUED through a phone call. The interview was also recorded and transcribed.

Data Analysis

Quantitative data were coded and analyzed using SPSS 23. Independent sample t-test was used to check for significant differences in the teaching skills (class process) of the two groups used in the research. Qualitative data were analyzed using qualitative content analysis which was used to extract words, themes and concepts from the transcribed texts according to characteristics of qualitative content analysis (Baxter, 2020).

Research Results

Findings on the Micro-Teaching Approach with a Higher Influence on Teaching Skills

The research sought to determine which of the micro-teaching approaches adopted by the two schools used in the research had a higher influence on teaching skills. The results of the independent samples t-test are presented in tables 1 and 2.

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Table 1
Micro-teaching groups statistics

	School			Bias	Std. Error
Teaching Skill	TASUED	*N*	33		
		$\bar{x}$	41.15	-.03	1.08
		SD	6.379	-.162	.815
		$SE_{\bar{x}}$	*1.110*		
	ZJNU	*N*	27		
		$\bar{x}$	44.37	.02	2.04
		SD	10.849	-.224	1.323
		$SE_{\bar{x}}$	2.088		

Note. n= Frequency for sample, $\bar{x}$ = Mean for Sample SD = Standard deviation, $SE_{\bar{x}}$ = Standard error of mean sample

Table 2
Independent sample t-test of the differences between the two micro-teaching approaches

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	*p*	*t*	*df*	*p*	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Teaching skills	Equal variance assumed	6.129	.016	-1.430	58	.158	-3.219	2.251	-7.724	1.286
	Equal variance not assumed			-1.361	40.178	.181	-3.219	2.365	-7.998	1.560

The results on Table 1 show the mean and standard deviation of the teaching skills of PsPT of the two schools which is ($\bar{x}$=41.15, *SD* =6.379) and ($\bar{x}$=44.15, *SD* =10.849) for TASUED and ZJNU respectively. The result showed that ZJNU had a higher mean score than TASUED. On further consideration from the results presented in table 2, it was found that though there was a difference in the mean score, the difference was not significant ($t_{(58)}$ =-1.430, p>.05). This implies that even though the micro-teaching approach in ZJNU gave a higher mean score, it is not significantly better than the micro-teaching approach adopted by TASUED.

Findings on Ways to Improve Teaching Skill through Microteaching

The PsPT educators of the two schools were interviewed using the structured interview schedule as shown in appendix II. Table 3 shows the content analysis of the opinion of the educators on ways in which teaching skills can be improved through micro-teaching.

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Table 3
PsPT Educators' opinion on the ways to improve teaching skill through micro-teaching

	Question	TAPTE	ZPTE
A	Type of teaching skills that can be acquired through micro-teaching	• Better understanding • Mastery of the Physics content	• General skills (teaching language and questioning ability, specific knowledge) • Mastery of physics exercises
B	Best way to improve teaching skill	Administering of questionnaire to know problems encountered by PsPT.	Combination of theory with practice
C	Problem(s) of micro-teaching	Time consuming	• Limited time • Stressful for teachers • Practical physics is excluded from the syllabus
D	Necessary reforms needed in Micro-teaching	Allocation of more time for micro-teaching	PsPT paying more attention to micro-teaching
E	To what extent has micro-teaching practice helped to improve teaching skill	About 80% effective	All round effective

Note. TAPTE= TASUED Physics teacher educator, ZPTE= ZJNU Physics teacher educator

Table 3 shows the content analysis of ways in which micro-teaching can be improved in Nigeria and China. The analysis shows that PsPT educators in both institutions agreed that micro-teaching practice enhanced a better understanding of the subject content. Besides, ZJNU PsPT educator said PsPT could also acquire general and specific skills. Direct quotes from the two PsPT educators are given below:

TAPTE: *"teaching skills the students can acquire through micro-teaching practice are better understanding and mastery of the student matter"*
ZPTE: *"Pre-service Physics teachers can get general skills (such as teaching language and questioning) apart from physics concepts. Students can also get specific skills about physics and teaching of the student physics exercises"*

The best way to improve teaching skill as shown in table 5 includes administering of questionnaire to the pre-service physics teachers to get feedback about their challenges and how it can be improved. The teaching process should combine theory and practical classes so that students can practice and modify their teaching skills as required. Direct quotes from the two PsPT educators are given below:

TAPTE; *"is to centre on the pre-service Physics teachers' challenges and this can be done by administering questionnaire to them. This will enable us to know the areas of student needs and put more light on it"*
ZPTE; *"both students and teachers need to combine theory with practical, in micro-teaching. Both students and teachers can discover some problems in their teaching process, get a better way to teach and implement it in their next practices"*

The common problem of micro-teaching as viewed by the two educators is that it is time-consuming. The educator from ZJNU is of the opinion that micro-teaching puts more pressure on educators. Direct quotes from the two PsPT educators are given below:

TAPTE; *"micro-teaching usually consumes time because it requires a small size of students in each lesson"*
ZPTE; *"time is limited, and it is stressful because the teacher has no time to rest during the class"*

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Reform in micro-teaching as viewed by the PsPT educator in TASUED is that more time should be allocated for microteaching so that pre-service teachers can cover the syllabus. On the other hand, the PsPT educator in ZJNU said PsPT should pay more attention to his/her teaching practices. Direct quotes from the two PsPT educators are given below:

TAPTE; *"reform in the time allocated to micro-teaching, this is because the student-teacher need to cover all the topics in the scheme of work for the academic term, but going by the current time given, he or she may not be able to cover up the syllabus"*

ZPTE; *"more important attention should be paid to micro-teaching by student teachers, this will allow them to acquire better teaching skills"*

The two educators rated the extent to which micro-teaching practice has helped to improve teaching skills (lesson plan, introduction of the lesson, presentation of the lesson and conclusion of the lesson). The educator from TASUEED rated that micro-teaching practice is about 80% effective because there is interaction between educators and pre-service teachers. The counterpart rated that it helps to improve teaching skills in all aspects. Direct quotes from the two PsPT educators are given below:

TAPTE; *"it is 80% because there is interaction between educator and pre-service teacher, educator will be able to make necessary corrections on their student's lesson note, introduction of lesson, lesson presentation and conclusion of the lesson"*

ZPTE; *"it is all-round effective because educators can give students feedback on time and the students will be able to practice more"*

Findings on the Significant Differences in the Influence of Microteaching Practice on Teaching Skill (Class Process)

Table 4
Results for group statistics

	School	*N*	$\bar{x}$	*SD*	$SE_{\bar{x}}$
Lesson plan	TASUED	33	7.70	1.468	0.256
	ZJNU	27	7.59	2.241	0.431
Introduction	TASUED	33	7.79	1.728	0.301
	ZJNU	27	8.04	2.724	0.524
Presentation	TASUED	33	15.36	3.190	0.555
	ZJNU	27	16.74	4.239	0.816
Conclusion	TASUED	33	10.30	2.443	0.425
	ZJNU	27	12.00	3.305	0.636

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Table 5
Results of independent samples test

		Levene's Test for Equality of Variances		t-test for equality of means						
		f	*p*	*t*	*df*	*p*	*MD*	Std Error Difference	95% CID	
									Lower	Upper
Lesson plan	Equal variance assumed	5.34	.024	.217	58	.829	.104	.481	-.859	1.068
	Equal variance not assumed			.208	43.149	.836	.104	.501	-.906	1.115
Introduction	Equal variance assumed	5.902	.018	-.431	58	.668	-.249	.579	-1.408	.909
	Equal variance not assumed			-.412	42.213	.682	-.249	.604	-1.469	.970
Presentation	Equal variance assumed	3.915	.053	-1.435	58	.157	-1.377	.959	-3.298	.543
	Equal variance not assumed			-1.395	47.407	.169	-1.377	.987	-3.362	.608
Conclusion	Equal variance assumed	.167	.146	-2.285	58	.026	-1.697	.743	-3.183	.210
	Equal variance not assumed			-2.218	46.836	.031	-1.697	.765	-3.236	.158

CID: Confidence interval of the difference

In the group statistics table as shown in table 4, we compared the mean values, standard deviation and standard Error mean of the two schools. The result indicates that the frequency (*n*) for TASUED (*n*=33) is greater than that of ZJNU (*n*=27).

For lesson plan, the result showed that TASUED ($\bar{x}$ =7.70, *SD*=1.468) had a higher mean score than ZJNU ($\bar{x}$ =7.59, *SD* =2.241). The differences in the mean scores of the two groups (*MD*=.104) was however not significant t_{58}= 0.217, p>0.05) which implies that there was no significant difference in the influence of micro-teaching practice on lesson plan of pre-service physics teachers in China and Nigeria. The null hypothesis 1 was therefore not rejected.

For lesson introduction, the result showed that ZJNU ($\bar{x}$=8.04, *SD* =2.724) had a higher mean score than TASUED ($\bar{x}$=7.79, *SD* =1.728). The differences in the mean scores of the two groups (*MD*=-.249) was however not significant t_{58}= -.431, p>0.05) which implies that there was no significant difference in the influence of micro-teaching practice on lesson introduction of pre-service physics teachers in China and Nigeria. The null hypothesis 2 was therefore not rejected.

For lesson presentation, the result showed that ZJNU (*n* =16.74, *SD* =4.239) had a higher mean score than TASUED (*n* =15.36, *SD* =3.190). The differences in the mean scores of the two groups (*MD*=-1.377) was however not significant t_{58}= -1.435, p>0.05) which implies that there was no significant difference in the influence of micro-teaching practice on lesson presentation of pre-service physics teachers in China and Nigeria. The null hypothesis 3 was therefore not rejected.

For lesson conclusion, the result showed that ZJNU (*n* =12, *SD* =3.305) had a higher mean score than TASUED (*n* =10.30, *SD* =2.443). The differences in the mean scores of the two groups (*MD*=-1.697) was also significant t_{58}= -2.285, p<0.05) which implies that there is a significant difference in the influence of micro-teaching practice on lesson conclusion of pre-service physics teachers in China and Nigeria. The null hypothesis 4 was therefore rejected.

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Discussion

This research compared microteaching practice skill acquisition in PsPT training program in Zhejiang Normal University, China and Tai Solarin University of Education, Nigeria. Crucial discussion can be inferred from the findings of this study about which microteaching practice approach has higher significant influence on the teaching skill acquisition of PsPT among the two approaches (i.e., Nigeria and China) and the ways to improve teaching skill through microteaching practices, which contradict the study carried out by He and Yan (2011). The result showed that China approach had a higher mean value than Nigeria approach, but it is not significantly better than the micro-teaching approach adopted by Nigeria PsPT program with respect to physics as a subject that requires motor skill. Microteaching practices which entail the repetition of phenomena applicable to the psycho motive domain has little or no research carried out to explore it (Egereonu, 2010). From the results, both approaches applied to the context of the class process can be mastered and acquired through microteaching aligned with the result given by Remesh (2013). Whether microteaching stands alone or is inculcated into teaching methodology, both approaches can promote teaching skill acquisition of the pre-service Physics teacher, as this result to some extents bears similarities with (Albhnsawy & Aliweh, 2016; Donnelly & Fitzmaurice, 2011) studies showing that the process of microteaching by using blended learning had a significant effect on the participants 'teaching skills, and it also helps students to gain insights into their lesson and become engaged in more reflective practices as one of the meaningful ways to acquire teaching skills.

From the result, PsPT educators in both institutions agreed that micro-teaching practice enhanced a better understanding of the subject content. Besides, the two educators rated the extent to which micro-teaching practice has helped to improve teaching skill (lesson plan, introduction of the lesson, presentation of the lesson and conclusion of the lesson) teacher educator from ZJNU noted that the pre-service Physics teacher could get a general skill from Physics concept which includes teaching language, and questioning. Apart from general skill, the student can also get specific skills in physics and teaching of the student physics tutorials. The ZJNU teacher's view might be responsible for the reason both approaches are significant. In the ZJNU approach, the PsPT can learn general skill about the teaching of physics embedded in microteaching, while in TASUED microteaching was majorly based on acquisitions of teaching skill which is 80% that resulted into an enhancement of better understanding and mastering of physics concept while the remaining 20% cater for the Physics methodology. Furthermore, in term of PsPT's acquiring lesson plan teaching skill, consistent with prior research done by Remesh (2013), the result showed that PsPT has positive perception towards it and this showed that both approaches could be used in microteaching practice to prepare good lesson note for microteaching. As PsPT have difficulty in analogizing the abstract concept of physics as a subject (Habibi et al., 2017). Similarly, Nilsson (2009) emphasized the importance of pedagogical reasoning by exploring student teachers' pedagogical reasoning in learning about teaching and the findings revealed that teachers are helping students to focus on critical incidents in their learning to teach with good content knowledge, to feel more confident in the classroom. This result supports our findings that PsPT should learn about their class process in microteaching practice.

The interview data revealed that the two groups of teacher educators perceived the best way to improve teaching skill through microteaching differently. First, the challenges of pre-service Physics teachers can be known by administering a questionnaire to them, identify the area of their needs and shed more light on it. Second, the findings suggest that both PsPT and their teacher educators need to combine theory with practice. In microteaching both students and teachers can find some problems in their teaching process, better ways to teach which in turn enable the student to perform better in their next practices to modify their practice, in line with (Koross, 2016; Ostrosky et al., 2012; Gödek, 2016). Future work could verify these assumptions.

Moreover, the common problem of micro-teaching as viewed by the two educators is that it is time-consuming, consistent with prior research done by Collins and Ting (2010). This study suggests possibilities of; reforming microteaching practices timing to reduce stress on teacher educators for proper competence; paying attention in the learning process of physics, as physics concept is psycho motive in nature and then microteaching can also be applied in physics. For this purpose, limits in student teachers' development in real-life classroom teaching competence can be solved on contrary to He and Yan (2011) research, that suggested microteaching should be supplemented with various alternative forms of school experience and practices.

Lastly, comparing the significant differences in the influence of micro-teaching practice on teaching skill (Class process) of the two countries, as regards to lesson plan, lesson introduction, lesson presentation there are no significant differences, while on lesson conclusion there is a significant difference in the two approaches.

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In this sense, the view of PsPT in two countries on the conclusion of the lesson was different; it is possible the PsPT have not really mastered the physics content that is why microteaching approaches in the acquisition of physics teaching skill must be treated as a psycho motive in nature. Furthermore, the results of this research are in line with the validation of the use of the psychomotor domain in a mathematical-related subject as suggested by Egereonu (2010).

Conclusions and Implications

The research compared the microteaching practice skill acquisition in PsPT training program at Zhejiang Normal University, China and Tai Solarin University of Education, Nigeria. This research generally contributes to current literature on the acquisition of teaching skill in physics teacher education. Based on the two research questions and four hypothesis raised, it was discovered that the microteaching practice approach has significant influence on the teaching skill acquisition of PsPT in both Nigeria and China training programs, with China approach had higher mean value than Nigeria approach. The results of the two approaches had significant influence on the teaching skill acquisition of PsPT with respect to physics as a subject that requires motor skill. Microteaching practices which entail the repetition of phenomena applicable to the psycho motive domain has little or no research carried out to explore it till date. From the results, both approaches applied to the context of the lesson plan, lesson introduction, lesson presentation had no significant differences, while lesson conclusion had a significant difference. It is, therefore, revealing the possibility that PsPT has not really mastered the physics content, in this regard, microteaching approaches in the acquisition of physics teaching skill must be treated as a psycho motive in nature, which can be mastered and acquired through aligning microteaching. Whether microteaching stands alone or is inculcated into teaching methodology, both approaches can promote teaching skill acquisition of the pre-service Physics teacher.

From the result, the teacher educator from ZJNU can get a general skill from Physics concept which includes teaching language and questioning apart from general skill and the student can also get specific skill about physics and teaching of the student physics tutorials. In the ZJNU approach, the PsPT can learn general skill about the teaching of physics embedded in microteaching, while in the TASUED approach microteaching was majorly based on acquisitions of teaching skill that resulted into an enhancement of better understanding and mastering of physics concept for the Physics methodology.

As PsPT have difficulty in analogizing the abstract concept of physics as a subject, it is certain that both approaches can be used in microteaching practice to prepare a good lesson note for microteaching. The findings show that the PsPT has a positive perception towards the PsPT's lesson plan for teaching skill. The importance of pedagogical reasoning should be emphasized to enhance student teachers' teaching skills while helping student teachers to focus on critical incidents in their learning to teach. This can be done more effectively when the PsPT learns about their class process in microteaching practice.

One of the ways to know how to improve teaching skill through microteaching is to administer a questionnaire to the pre-service Physics teachers to know and identify areas of their challenges and needs. Secondly, both PsPT and their educators need to combine both theories with practice, in microteaching so that both students and teachers can find some problem and solution in their teaching and learning process to enhance effective teaching and learning.

Based on the research results, the following suggestion was made: The physics teacher educators need to focus on developing PsPTs' psychomotor domain, in line with time reform in microteaching practices to accommodate more time for PsPTs' to master the subject concept of physics as a psycho motive subject. However, the microteaching practice can employ different approaches which can lead to acquisition of teaching skill by pre-service teachers.

Further research could examine the comparative effect on other science subjects. Since the fostering acquisition of teaching skill in PsPT in China has enhanced the rating of China training program as the best in PISA, further research can examine the connection between the teacher education program and other factors, and the poor performances of students in WASSCE (in Nigeria). This is suggested because the same sets of trained physics teachers are employed to teach in senior secondary schools. It is possible the physics teachers have not really mastered the physics content. Most researchers fail to explore the psycho motive nature of physics, and also the teachers teaching physics as a subject in Nigeria secondary schools might not be trained to this extent.

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Appendix I

PsPT Class Process Questionnaire

This questionnaire asks about your opinion as regards to: "***COMPARATIVE PERSPECTIVE OF TEACHING SKILL ACQUISITION IN PRE-SERVICE PHYSICS TEACHER (PsPT) TRAINING PROGRAM IN CHINA AND NIGERIA".*** Please read each statement carefully and rate your view and the importance you place on each of the tasks by ticking the number that corresponds to your response. Thanks for participation.

SECTION A

1. Name of School: TASUED ☐ ZJNU ☐
2. Gender : Male ☐ Female ☐

SECTION B

Please tick {√} the appropriate response to your best of knowledge
Strongly Agreed (SA) = 1, Agreed (A) = 2, Disagreed (D) = 3 and Strongly Disagreed (SD) = 4.

	1	2	3	4
A. Influence of microteaching practices on lesson plan of pre-service Physics teachers.				
1. Microteaching helps me to know what to teach my students (specific objectives)				
2 It helps me to learn how to plan what to teach in the classroom				
3 Chosen a realistic goal makes easy with the help of Microteaching				
4 Microteaching helps me to know how to select appealing or rightful resources to teach				
5 I know my students' needs with the help of microteaching				
B. Influence of microteaching practices on introduction of lesson of pre-service Physics teachers				
6 I learn how to get learners' attention through microteaching				
7 I learn how to arouse the interest of my pupils through microteaching				
8 I know how to ask my students about prior knowledge through microteaching				
9 I know how to explain what students' will learn in the classroom through microteaching				
10 I know how to connect prior knowledge with the new learning objectives through microteaching				
C. Influence of microteaching practices on lesson presentation of pre-service Physics teachers				
11 I provided direct steps of the content to my students with the help of microteaching				
12 I know how to check for my students understanding during presentation of steps				
13 Technology media makes my presentation easy with the help of microteaching				
14 I learn how to present lesson steps slowly and distinctly when teaching through microteaching				
15 I know how to switch in-between different teaching methodology with the help of microteaching				
16 I know how to use instructional material to facilitate my lesson through microteaching				
17 I know how to make learning objective much clearer and get down to the students' level through microteaching (student-centered)				
18 I have learned how to keep checking students' comprehension periodically through microteaching				
19 I have learned how to create an exciting learning environment for my students				
20 I have learned how to reinforce my student effort with praise during the lesson				
D. Influence of microteaching practices on conclusion of lesson of pre-service Physics teachers				
21 Microteaching helps me to know how to get feedback from my students				
22 I learn how to ask questions on what the students have learned, what is unclear and what they will like to learn more through microteaching				
23 I now know how to conclude my lesson through microteaching				
24 I know better way to answer my students' questions through microteaching				
25 Microteaching assists me to know the appropriate learning task to give to my students prior to next lesson				
26 I have learnt proper ways to evaluate my students through microteaching				
27 Through microteaching, I know how to evaluate through application				

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Appendix II

Micro-teaching Improvement Interview Schedule

Structured questions on the ways to improve teaching skill through microteaching for the study were

1. What kind of teaching skill pre-service Physics teacher can acquire through microteaching?
2. What is the best way to improve teaching skill?
3. Are there some problems of microteaching in improving teaching skill?
4. If you had the opportunity to reform microteaching what could you do?
5. To what extent has microteaching practices helped to improve teaching skill of pre-service Physics teachers?

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