



Reliability and Validity of Teaching Practice Assessment Instrument's ability to Predict NCE teachers' Teaching Effectiveness in Kaduna State, Nigeria

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ABSTRACT

The aim of this study was to investigate the reliability and validity of teaching practice assessment instrument used by the Federal College of Education, Zaria in assessing her NCE teacher trainees (pre-service teachers) and to employ the same instrument in predicting her trainees' effectiveness as serving professional teachers after graduation. Methodological and cross-sectional research designs involving 572 teachers (512 NCE primary school teachers and 60 secondary school teachers) were used for the study. Three instruments were used for the study, viz, Teaching Practice Assessment Template (TPAT 1 and 2) and photocopies of serving NCE teachers' certificates (PSTC). Three research questions were stated and answered and two hypotheses were tested. The reliability analysis of the instrument for the data collected was carried out using Cronbach's alpha internal consistency coefficients, test-retest external reliability coefficients and correlated item-total correlation coefficients. The validity analysis of data was performed using exploratory factor analysis with varimax rotation method while the relationship of the pre-service NCE teachers' performance to their performance as professional/serving teachers was established by Pearson's Product Moment Correlation coefficient. The effectiveness of the serving teachers was predicted by t-test for correlated samples. The results revealed that the teaching practice assessment instrument of the College is reliable: the internal consistency reliability of the whole instrument is 0.993 while its seven segments' reliability values range from 0.869-0.984, all by Cronbach's alpha reliability estimates; by test-retest approach, 64% (16) out of the 25 items of the instrument displayed external reliability ranging from 0.373-0.692 ($p < 0.05$); corrected item-total correlations showed reliability values of the items to be between 0.855-0.966 ($p < 0.05$). The validity of the instrument was also established as 24 out of its 25 items by exploratory factor analysis accounted for 92.2% of the total variance. Although the trainee teachers' assessment scores showed no significant correlation with their scores as professional and serving teachers ($r = -0.083$, $p < 0.05$), there was a statistically significant difference in the mean performance of the two groups – the difference being in favour of the serving/professional NCE teachers. This means the NCE products of the College are effectively doing well as professional teachers. In the light of the findings of this study, it is recommended that the use of the teaching practice assessment instrument of the College should be continued with little modifications as presented in the research so as to direct teaching practice supervisors and cooperating schools head teachers properly on what to look for in scoring the trainee teachers. Also, the wrong conception that the NCE products of the College are not doing well in their callings should be discarded.

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INTRODUCTION

The primary aim of any teacher training institution or faculty of a university connected with teacher education is to produce

knowledgeable, skillful, morally sound and efficient teachers who will be able to impact effectively the knowledge, skills and values so gained to younger minds. One of the composite

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parts of the overall training of teachers for this goal is the involvement of student-teachers in teaching practice which Taneja (2000), describes variously as student teaching, field studies, in-field experience, school-based experience or internship. Teaching practice, therefore, can be seen as an equivalent or replica of housemanship in medical profession, court attachment for lawyers and student industrial work experience scheme (SIWES) for engineering profession and other related courses (Jekayinfa *et al*, 2012; Emerole & Muraina, 2015).

Teaching practice is a crucial aspect of teacher education (Farrel, 2008; Gujjai 2009, NCCE, 2012). It is usually embarked upon by teacher-trainees in colleges of education running programs leading to the award of Nigeria Certificate in Education (NCE) or universities whose programs lead to the award of Bachelor's degrees in arts education, science education, education or postgraduate diploma in education (PGDE).

Furlong, Hirst and Pocklington (1988) noted that teaching practice affords the pre-service teachers the opportunity to become socialized into the teaching profession. Idowu (2000) remarked that the student-teachers in teaching practice are not limited to the classroom teaching which would only promote the cognitive behavior of their pupils but do also affect their psychomotor and affective behaviours. Thus, teaching practice encompasses a wide range of experiences to which student-teachers are exposed as they work in classrooms and schools. These experiences range from curricula activities such as teaching, preparation of timetable, taking classroom attendance and extra-curricular activities (games, sports, manual labour etc), as they relate to the day-day running of schools.

For NCE awarding institutions, the National Commission for Colleges of Education NCCE (1996) outlined the objectives of teaching practice to include:

- (i) Helping student teachers to develop positive attitude towards the teaching profession.
- (ii) exposing student-teachers to real life experience under the supervision of professional teachers

- (iii) enabling student-teachers to discover their own strengths and weaknesses in teaching
- (iv) provision of a forum to translate educational theories and principles into practice
- (v) familiarizing them with school routines
- (vi) exposing student-teachers to the total school environment
- (vii) providing student-teachers with the necessary skills, competences, personal characteristics and experiences for real life teaching after graduation
- (viii) serving as a means of assessing the professional competences of students-teachers

From the standpoint of NCE minimum standards, building some of these values into the trainee teachers should start in the training institutions where the student-teachers are expected to be assigned to professional teachers for mentoring before microteaching for continuous support (NCCE, 2012). After the microteaching, the student-teachers are then free to proceed on three months teaching practice in the first semester of their third year. In fact, student-teachers that fail microteaching should not be allowed to proceed on in-field experience (NCCE, 2012). The student-teachers normally practice in the schools of their own choice and teach in their respective subject areas of specialization to ensure a focused and well-informed supervision based on the professional skills of their supervisors (NCCE, 2012).

As noted before teaching practice is expected to expose student teachers to all school programs. However, during supervision, emphasis is on classroom practice for which the student-teachers are assessed and given instant feedback. Each student teacher is expected to have at least four (4) supervisions or at most 6 supervisions of 80% from his/her different supervisors. The mean supervision score of each trainee teacher is then added to the 20% score from the co-operating school to arrive at a total of 100% score per student-teacher. All the scores are subsequently subjected to external moderation first, before approval by the Academic Board of the teacher teaching institution for final release to student teachers.

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In the process of supervision, the supervisors employ teaching practice assessment instrument prepared and produced by the teaching practice unit of the college. This instrument has six thematic areas which include student-teacher's preparation of lesson plans, presentation of lessons, management of classrooms, communication skills, and methods of lessons evaluation and personality of the student-teacher.

With the content and pedagogical knowledge acquired by the pre-service teachers and their exposure to such a comprehensive nature of teaching practice course, it is expected that their assessment especially with respect to teaching practice course should bear a true reflection of the effectiveness of the student-teacher after graduation. This is the position of Jekayinfa *et al* (2012) that teaching practice should serve to predict the performance of trainees when finally the trainees are engaged as permanent staff. If the teaching practice instrument is valid and reliable, its assessment should also be valid and reliable and such assessment should predict the performance of the student-teachers working as permanent staff. The validity of an instrument refers to the ability of the instrument to measure what it is intended to measure while its consistency in measuring what it is expected to measure is its reliability.

Statement of the Problem

Comments often received about NCE graduates of Colleges of Education usually smack off their appalling performance and ineffectiveness. In Kaduna State, for example, over 22,000 teachers mostly from primary schools who are expected to be holders of NCE were laid off in 2017 by the State Government on grounds of ineffectiveness (Olawoyin, 2017; Nwachukwu, 2018). The Federal College of Education, Zaria is one of the major feeder institutions of this State with NCE teachers. If the graduates of this institution working in the State are ineffective, it means the College assessment system, especially with regards to teaching practice, may be faulty. The reliability index/validity of the teaching practice assessment instrument of the College cannot be found anywhere, although it is described as

standardized. It is therefore necessary to investigate this instrument's reliability-cum validity and how its assessment can be used to predict the serving teachers' effectiveness. It is against this background that the study is conducted.

Objectives of the Study

This study was designed to achieve the following objectives;

- (i) Evaluate the reliability/validity of the teaching practice assessment instrument used for pre-service NCE teachers in Federal College of Education, Zaria.
- (ii) Investigate the relationship/difference between the assessment of pre-service NCE teachers of the College and their assessment as serving teachers in predicting the teachers' effectiveness.

Research Questions

The study sought to give answers to four research questions and to test two null hypotheses, namely:

1. What is the reliability of the teaching practice assessment instrument employed by Federal College of Education, Zaria in assessing pre-service NCE teachers before their graduation?
2. How valid is the teaching practice assessment instrument for this purpose?
3. What is the relationship between the assessment scores obtained by pre-service NCE teachers of the College before graduation and the assessment scores they obtain as serving NCE teachers via the same assessment instrument?

Hypotheses

H₀₁ There is no significant relationship between the assessment scores obtained by pre-service NCE teachers of the College before graduation and the assessment scores they obtain as serving teachers using the same assessment instrument.

H₀₂ There is no significant difference between the mean assessment score of pre-service NCE teachers and their mean assessment score as serving NCE teachers in predicting their teaching

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effectiveness when assessed using the same instrument.

METHODOLOGY

The study made use of methodological and cross-sectional research designs as it intends to develop validity and reliability of an instrument and to gather data from part of the research participants through observation using the same instrument.

A total of 572 teachers (512 primary school teachers and 60 secondary school teachers) in 2021/2022 academic session in Kaduna State of Nigeria constituted the study group. While the 60 secondary school teachers were purposively sampled from two secondary schools, the 512 primary school teachers were selected by multistage sampling technique from 6 out of the 23 primary education areas in the State. For each primary education area, 20 schools and for each school, 5 teachers were randomly sampled except one primary education area where only 12 teachers were found.

All the 512 primary school teachers from the 103 schools were selected from a target population of 35,000 public primary school teachers in the State. They were all NCE graduates of the Federal College of Education, Zaria for the past 6 years (2014/2015 – 2019/2020). The use of public primary schools/teachers was borne out of the fact that the over 22,000 teachers who were disengaged from service for ineffectiveness in 2017 in Kaduna State were from public primary schools.

Three instruments were used for this study, namely, Teaching Practice Assessment Template (TPAT 1&2) and photocopies of serving teachers' NCE certificates (PSTC). The TPAT is adapted from NCE Standardized (sic) teaching practice assessment (Form A). This is obtained from the TP unit of Federal College of Education, Zaria. The reliability of the 'standardized' teaching practice assessment (Form A) is not known. The original Form A has two parts: Part A consist of the name of the student-teacher, subject combination and registration number, name of co-operating school, subject to be taught, the topic, class, number of pupils in the class and duration of the lesson.

Part B has six units with marks assigned. These are preparation of lesson plan (LP) (10marks); lesson preparation (PRE) (42marks); class management (CM) (10marks); communication skills (CSK) (8marks); evaluation (EV) (5marks) and teachers' personality (TP) (5marks). LP, PRE, CM, CSK, EV, and TP have 3, 10, 2, 2, 2, 2, items respectively. The distribution of marks for all the units in Part B gives a total of 80marks with 20marks to be contributed by the co-operating school. The Part B of the format was restructured and another unit bearing 20marks to be contributed by the cooperating school was added. This was abbreviated CS and has 4 giving a total of 25 items to TPAT. All the contents of the various units of the instrument were reframed to elicit responses from the school head teachers/researchers/research assistants for scoring appropriately (e.g. under preparation of lesson plan, the content "statement of objective" in Form A was reframed to read the teacher states his/her lesson objective overtly"). Part A of the original Form A is also reframed to include only the name of school, name of teacher (not student), teacher's teaching qualification, area of specialization and question regarding whether the teacher participated in teaching practice or not in his/her pre-service years. The letter grade given to the teacher for participation was sought from the photocopies of the teachers' NCE certificates in the school files and written in the space provided for analysis. The restructured Parts A & B of the teaching practice assessment Form A constitute the TPAT-1 and attracted a total of 100% marks. It was used by the researchers to assess the NCE serving teachers' teaching effectiveness.

TPAT-2 was a 4 point Likert scale having the same statements and number of items as in TPAT-1 but designed to elicit responses on Strongly Agree (4 points), Agree (3points), Disagree (2 points), and Strongly Disagree (1 point). It was used to evaluate the validity and reliability of the instrument.

TPAT-1 and TPAT-2 were administered during normal school hours to the participating subjects through their head-teachers. The researchers and their assistants made on-the-spot assessment of teaching

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session by the serving teachers using TPAT-1 and as well extracted on to the TPAT-1 their pre-service earned teaching practice assessment scores. Altogether, the 512 copies of TPAT-1 administered to primary school teachers and 61 copies of TPAT-2 administered to secondary school teachers were all retrieved for data analysis.

The data collected for the study were analyzed using Cronbach's alpha reliability coefficient, test-retest and corrected item-total correlation coefficients to answer the question on

reliability while the construct validity of the assessment instrument was ascertained by exploratory factor analysis using principal component analysis with Varimax rotation technique. The means, standard deviations and Pearson's Moment Correlation of pre-service and serving teachers' scores were used to answer research questions 3 and 4 while the two hypotheses were tested by judging the significance of r-value and its transformed t-test value.

Table 1: Cronbach's Alpha Reliability Analysis of TPAT

Segment	Number of items	Cronbach's Alpha Value
Cooperating School	4	0.958
Lesson Preparation	3	0.961
Lesson Presentation	10	0.984
Class Management	2	0.869
Communication Skills	2	0.977
evaluation	2	0.902
Personality of Teacher	2	0.933
TPAT (as a whole)	25	0.993

N = 61

The results of the analysis show that the instrument itself with its seven segments has excellent internal consistency of its items by the rating of George and Mallery (2003). It can therefore repeatedly and consistently measure what it was meant to measure.

A further analysis of reliability by test-retest approach was carried out. Here TPAT was administered twice between an intervals of two weeks apart to 31 similar respondents. The results analyzed by Pearson's Product Moment Correlation formula are presented in Table 2.

Table 2: Test-Retest Reliability Results of TPAT.

ITEMS	r-value
CS	
Does this teacher appear neat and humble?	0.138ns
Does the teacher attend to his/her duties punctually?	0.555*
Is the teacher actively involved in the school curricular activities?	0.692*
Is the teacher ready to work?	0.479*
LP	
The teacher states his/her lesson objectives overtly.	0.373*
The contents of the teacher's lesson are logical and sequential.	0.129ns
The contents of his/her lesson are adequate.	0.609*
PRE	
The teacher's introduction of the lesson is relevant.	0.481*
The teacher develops his/her lesson very well (check lesson notes).	0.297ns
Does the teacher display mastery of his/her subject in the teaching process?	0.313ns
The teacher develops competence in the use of chalkboard.	0.667*
He manages his/her time well in lesson delivery.	0.562*

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The teacher employs the technique of questioning properly.	0.535*
He/she prepares relevant instructional materials and uses them effectively.	0.584*
His/her class is lively and pupils participate actively.	0.283ns
His/her classroom environment is neat and conducive.	0.506*
He/she concludes the lesson smoothly.	0.376*
CM	
Does the teacher show competence in class management/ control?	0.420*
He/she reacts appropriately and reinforces the learners.	0.576*
CSK	
The teacher speaks clearly and his/her voice is audible to the audience.	0.505*
He/she is fluent in English language of communication.	0.342ns
EV	
The teacher's assessment of the pupils during and after the lesson is suitable.	0.179ns
The teacher accomplishes all his/her objectives.	0.685*
TP	
The teacher dresses neatly.	0.261ns
The teacher displays good comportment during lesson delivery.	0.258ns

N = 31; r Critical = 0.361; * Significant at $P < 0.05$

Table 2 shows that 9 out of 25 items of the instrument have no significant correlation coefficient by test-retest external reliability approach. This is 36% as against 64% of the items that correlated significantly ($P < 0.05$). The high percentage, however, reflects adequate

stability and consistency reliability of the instrument.

The corrected item – total correlation involving 61 respondents was additionally applied to test the reliability of the instrument and the results are presented in Table 3

Table 3: Corrected item-total correlation coefficient of TPAT

Items	Correlated r-value
Does the teacher attend to his/her duties punctually?	0.914
Is the teacher actively involved in the school curricular activities?	0.899
Is the teacher ready to work?	0.962
The contents of the teacher's lesson are logical and sequential.	0.927
The contents of his/her lesson are adequate.	0.964
The teacher's introduction of the lesson is relevant.	0.927
The teacher develops his/her lesson very well (check lesson notes).	0.937
Does the teacher display mastery of his/her subject in the teaching process?	0.957
The teacher develops competence in the use of chalkboard.	0.939
He manages his/her time well in lesson delivery.	0.951
The teacher employs the technique of questioning properly.	0.930
He/she prepares relevant instructional materials and uses them effectively.	0.882
His/her class is lively and pupils participate actively.	0.966
His/her classroom environment is neat and conducive.	0.874
He/she concludes the lesson smoothly.	0.887
Does the teacher show competence in class management/	

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control?	0.956
He/she reacts appropriately and reinforces the learners.	0.874
The teacher speaks clearly and his/her voice is audible to the audience.	0.927
He/she is fluent in English language of communication.	0.955
The teacher's assessment of the pupils during and after the lesson is suitable.	0.876
The teacher accomplishes all his/her objectives.	0.855
The teacher displays good comportment during lesson delivery.	0.957

N = 61; r critical = 0.250; significant at P < 0.05

Table 3 reveals that the corrected item-total correlation coefficient of the instrument lie between the range of 0.855 – 0.966. These are all statistically significant (Critical r = 0.250 at P < 0.05). The high values further affirm the internal

consistency reliability of the items and the instrument. The r-values being above 0.2 also show significant discrimination of the items (Ferketich, 1991).

Table 4: Principal Component Analysis for Validity of TPAT

Items	Component Loadings		
	1	2	3
The teacher speaks clearly and his/her voice audible to audience	0.868		
Teacher introduction of lesson relevant	0.868		
Teacher states his/her lessons overtly	0.842		
Teacher develops his/her lesson very well	0.841		
Does the teacher appear neat and humble?	0.827		
He/she is fluent in English language	0.816		
Is the teacher ready to work?	0.752		
Does the teacher show competence in class management/control?	0.747		
The teacher manages his/her time well in lesson delivery	0.745		
His//her class is lively and pupils participate actively	0.710		
Does the teacher attend to his/her duties punctually?	0.704		
The contents of his//her lessons are adequate	0.696		
Does the teacher display mastery of his/her subject in the teaching process?	0.685		
The teacher displays good comportment in lesson delivery	0.685		
Teacher develops competence in the use of the chalk board	0.633		
His/her classroom environment is neat and conducive		0.876	
He/she reacts appropriately and reinforces the learners		0.876	
He/she prepares relevant instructional materials and uses them effectively		0.848	
He/she accomplishes all his//her lessons objectives		0.840	
He/she concludes lessons smoothly		0.824	
He/she employs the technique of questioning properly		0.722	
His/her assessment of pupils during and after lesson is suitable		0.665	
Is the teacher actively involved in the school curricular activities		0.603	
The contents of the teaches lesson are logical and sequentially			0.622
Eigenvalue	21.59	1.46	0.53
%Variance explained	86.36	5.85	2.14

N = 61; Factor loadings < 0.6 omitted because of sample size

The construct validity of the instrument was evaluated by factorization (Table 4). The correlation matrix of the items showed very high correlation with a low determinant factor. The average communality of 0.925 was high and also contributed to qualify the instrument for exploratory factor analysis. The principal component analysis with Varimax rotation method, was applied. Three components were requested. The first component with highest factor loading of 0.868 and lowest loading of 0.633 had eigenvalue of 21.59 and accounted for 86.36% of the variance; the second component with the highest factor loading of 0.876 and lowest loading of 0.603 had eigenvalue of 1.46

and accounted for 5.85% of the variance; the third could not be considered as a component for having less than 3 items (Gracia, et al, 2000). Its 0.622 factor loading has an insignificant eigenvalue (Hair, 2014). Therefor total variance accounted for is 92.21%. The way the variables cluster in the components and their factor loadings are shown in the Table.

From the table, it can be seen that the factor loadings (for the 16 items in component 1) and (8 items in component 2) are high. The items are, therefore, substantially related and coherent except the last item in the table which stands alone. The instrument can therefore measure what it is intended to measure.

Table 5: Results of Pearson's Moment Correlation of Pre-service NCE Teachers Scores with Serving NCE Teachers Scores

Source of Variation	N	Total Scores	$\bar{x}$	SD	df	r	p
Pre-service NCE teachers scores (X-scores)	512	31,446,528	61.42	5.83			
Serving NCE teachers' scores (Y-scores)	512	36,559,872	71.41	10.87	510	-0.083 (ns)	0.061

Critical $r = 0.087$; ns not significant at $p < 0.05$

From Table 5, there is no significant relationship between the pre-service teachers' scores and the serving teachers' scores using the same instrument (r calculated = -0.083; r critical value = 0.087 or p calculated = 0.061; p -set value = 0.05). However, the mean value for

the serving teachers is higher than that of the pre-service teachers by a difference of 9.99. Is the difference significant? This leads to Table 6 in which the t-test for correlated data is employed.

Table 6: Result of t-test analysis of Pre-service NCE and Serving NCE Teachers' Scores

Source of Variation	N	$\bar{x}$	SD	t-value	P
X-Scores	512	61.42	5.83		
Y-Scores	512	71.41	10.83	18.33*	0.000

* $P < 0.05$

From Table 6, there is a significant difference in the mean performance scores of the two groups. The difference is in favour of the serving NCE teachers. This means that the serving teachers perform significantly better than what they did when they were student teachers using the same assessment instrument (TPAT).

DISCUSSION

Findings of this study as displayed in Tables 1-6 reveal that the total 25 item teaching practice assessment instrument has a high reliability index of 0.993 (its seven segments show internal consistency reliability values of between 0.869-0.984) all by Cronbach's alpha reliability coefficients. These are excellent internal consistency values by the rating of George and Mallery (2003). By test-retest

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approach, 64% of the items of the instrument correlated positively and significantly with r -values between 0.373-0.692 ($P < 0.05$) showing its stability level by external reliability measurement. This percentage is expected since it is an external measurement that can be affected by the state of bias of the testees (Glen, 2023). However, it does not show the instrument to be unreliable. When the 25 items were correlated with the total and the corrected item-total correlations obtained, the corrected item-total correlations ranged from r -values of 0.855-0.966. The values are all significant ($P < 0.05$) and in accordance with Opariuc-Dan (2013) reliability values for a multidimensional instrument such as this used in this study. That the r -values are above 0.2 further indicates significant item discrimination.

From the exploratory factor analysis, the 25-item instrument (TPAT) has only two meaningful components. The high factor loadings for component number 1 and component number 2 with their Eigenvalues and the 92.2% of the total variance accounted for shows that the instrument has construct validity. Only one item deviated from the group of items with a loading of 0.622. This is probably because of the double-barreled nature of the item (i.e. one part being "logical" and another part being "sequential"). The trainee teachers' assessment scores with TPAT show no significant correlation with their scores as professional/serving teachers using the same instrument. However there is a statistically significant difference in the mean performance of the two groups of teachers, the difference being in favour of the serving/professional NCE teachers.

CONCLUSION AND RECOMMENDATIONS

The major objective of this study was to investigate the reliability and validity of teaching practice assessment instrument employed by the Federal College of Education, Zaria in assessing her NCE teacher trainees and to use the same assessment instrument in predicting her trainees' effectiveness serving as professional teachers after graduation. In the light of the findings of this study, it can be concluded that the teaching practice assessment instrument used by the College has a high reliability and validity. That

means it is consistent in its measurement and also measures what it is intended to measure. Its continuous use is therefore recommended with little modifications as presented in this study to direct the teaching practice supervisors and the cooperating school head-teachers on what to look for in scoring the trainee teachers. The double-barreled item spotted in this study should be separated and reworded. Contrary to wrong conceptions, the NCE products of the College are doing very well as serving teachers because with the same instrument of assessment, their performance by far surpassed that when they were student teachers.

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