Examining Attitude towards Continuous Assessment Practices among Nigerian Preservice STM Teachers

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Abstract
The study investigated the attitudes of 339 preservice Science, Technology and Mathematics (STM) teachers towards continuous assessment practices in Nigeria within the blueprint of a descriptive survey research design in a conventional university. Data were collected using an instrument tagged preservice STM teachers' attitudes toward CA questionnaire in which respondents were to indicate the extent of their agreement or otherwise, on a modified five–point Likert attitude measuring scale, to a set of 39 statements made on various assessment practices. Results showed that a higher proportion of the preservice STM teachers seemed to display positive attitudes toward most of the continuous assessment practices while their attitudes toward some assessment practices tended to be either negative or neutral. Although gender and age might not be factors in preservice STM teachers' attitudes toward continuous assessment practices, discipline of study was the only potent predictor of preservice STM teachers' attitudes towards CA practices.
Keywords: Attitude, continuous assessment practices, preservice science, technology, and mathematics teachers, Nigerian.

1. Introduction

Assessment is not merely testing (Osokoya, 1996), it is a process through which the quality of an individual's work or performance is judged (Mwebaza, 2010). In relation to school setting, Greaney (2001) defines assessment as any procedure or activity that is designed to collect information about the knowledge, attitude, or skills of the learner or group of learners. Thus, in the context of education, assessment can be defined as a predetermined process through which the quality of a student's performance in the three domains of educational objectives (cognitive, affective, and psychomotor) is judged. Assessment of students learning of curriculum contents in the area of knowledge, skills, and values is a major pre-occupation of many educational reforms. This is because results from such assessment not only provide feedbacks regarding the educational progress of students but remain the authentic yardstick for gauging the effectiveness of the teacher, the quality of instruction, and in part the functionality of any curriculum reform. Continuous assessment as an assessment carried out in an on-going process (Mwebaza, 2010) is an objective judgment considered an important part of structured assessment purposely designed and administered to enable the teacher to evaluate some aspect of a student learning at a specific time.

A number of characterisation of CA exists in the literature. According to Aggarwal cited in Mwebaza (2010), CA is not simply continuous testing. Continuous assessment does not solely depend on formal tests. CA is more than giving a test; it involves every decision made by the teacher in class to improve students' achievement. Continuous assessment as only a part of the field of educational evaluation is a method of evaluating the progress and achievement of students in educational institutions (Yoloye, 1991). This means that continuous assessment could be used to predict future students' performance in the final examinations and the possible success of individuals at the work place or on a particular job. CA is a formative evaluation procedure concerned with finding out, in a systematic manner, the over-all gains that a student has made in terms of knowledge, attitudes and skills after a given set of learning experience (Ogunniyi, 1984). A more comprehensive definition of CA is given by Ezewu and Okoye (1981). They see continuous assessment within the educational context as a systematic and objective process of determining the extent of a students' performances and all the expected changes in his behaviour from the day he enters into a course of study in a continuous and progressive manner to the end of such a course of study and a judicious accumulation of all pieces of information derived from this purpose, with a view to using them to guide and shape the student in his learning from time to time and to serve as bases for important decision about the child.

Continuous assessment is defined as a mechanism whereby the final grading of a student in the cognitive, affective and psychomotor domains of behaviour takes account in a systematic way, of all his performances during a giving period of schooling. Such an assessment involves a great variety of modes of evaluation for the purpose of guiding and improving the learning and performance of the student (Nigeria Federal Ministry of Education, 1988). CA is an ongoing diagnostic and school-based process that uses a variety of assessment tools to measure learner performance (Zambia Ministry of Education, 2007). Continuous assessment could also be defined as a mechanism whereby the final grading of learners' progress in the cognitive, affective and

psychomotor domains of learning systematically takes account of all their performances during a given period of schooling (Falayajo, 1986). Based on this definition, one could infer that CA is an assessment approach which involves the use of a variety of assessment instruments (e.g. tests, projects, portfolios, assignment, interviews, checklists, rating scale, inventories, anecdotal records and sociometry), assessing various components of learning, not only the thinking processes (cognitive) but including attitudes, motives, beliefs, behaviours, personality traits (affective) and dexterity (psychomotor). Continuous assessment refers to making observations and collecting information periodically to find out what a student knows, understands and can do with the target of making an ongoing judgment about how well he/she is doing (duPlessis, Prouty, Schubert, Habib & George, 2003). Bajah (1984) defined continuous assessment as a continuous updating of judgment about performance in relation to specific criteria which will allow a cumulative judgment to be made about performance upon these same criteria at any time. Falayajo (1986) described continuous assessment as a system of assessment which is carried out at predetermined intervals, usually coinciding with some identifiable units of instruction or levels of educational system, for the purpose of monitoring the progress or otherwise of students and the general performance of the education system. Some other terms that are similar to continuous assessment are: classroom based assessment, running records, and teacher grading. Continuous Assessment is carried out at periodic intervals for the purpose of improving the overall performances of learners and of the teaching/learning process (Obioma, 2005). A continuous assessment scheme is one that involves a systematic collection of marks or grades into a final score taken into account in deciding the candidate's final grades. The most distinctive feature of continuous assessment, in general, is that it is a cumulative process, developing as the pupil develops and reflecting his/her changes in response to the course (Njabili, 1999).

Based on this reviewed conceptualisations of CA, it pertinent to note that they all agree on the following: Continuous assessment occurs on a regular and continuous basis, it is an ongoing formative and summative process, involves the monitoring of pupils, is integrated with teaching, involves a systematic collection of marks or grades into a final score, may be used to determine the candidates' final grades, reflects students' abilities over a period of time, allows for improvement, takes care of students' learning in the three domain of educational objectives, and it is a cumulative process. More so, a critical examination of the various views and definitions of continuous assessment presented earlier shows some definite characteristics which educators and evaluators have consistently emphasized. These include that C.A. is (i) systematic; (ii) comprehensive; (iii) Cumulative; and (iv) guidance-oriented and according to Osokoya (1996) these features make it possible for both the pupils and the teachers to get the requisite information that would guide the future development of the pupils in term of subjects to be taken and career options to be pursued. However, major evidence weighted in support of CA in schools is that students who are assessed continuously obtain better results than those of equal ability, assessed through a single examination (Nneji, Fatade, Awofala & Awofala, 2012, Mwebaza, 2010). This is because continuous assessment allows for more opportunities to test a wide range of abilities over a longer period of time than through a single examination (Eimann, 2002). duPlessis, Prouty, Schubert, Habib and George (2003) highlighted nine reasons for using CA in school settings which include (i) to gain confidence in what we say our students know and can do; (ii) to provide all children with opportunities to show what they know; (iii) to promote learning for understanding; (iv) to improve teaching; (v) to help determine what kind of remediation and enrichment activities to provide, and to identify which students need assistance; (vi) to let the students know how well they are progressing in their own learning; (vii) to let parents know how their children are progressing; (viii) to lead to overall evaluation; and (ix) to find out what students know and can do. Other advantages inherent in the use of CA when viewed in a favourable light against traditional examinations include: CA makes it possible to assess qualities that are not assessed in traditional examinations and provides the teacher with additional information about learners (Le Grange & Reddy, 1998). Continuous assessment allows the teacher to concentrate not only on the basic skills and rote learning, but also on the higher cognitive levels of thinking (Gipps, 1994). Continuous assessment increases the accountability of continuous assessment results from one teacher to another (Nitko, 1995). In spite of these numerous advantages of CA, it is not without disadvantages. One of such disadvantages is that CA leads to an increase in both the learner and teacher workload in the area of extensive record keeping and monitoring of individual learner's work throughout the school year (Njabili, 1999). More so, ascertaining students' ongoing assessment through projects given as assignment/homework may increase the tendency for parents, siblings and other persons to assist students in doing these projects and such assessments by teachers may not give accurate reflection of the students' abilities. Other disadvantage may result from different schools adopting different approaches to CA and this lack of comparability of assessment procedures and standards may have a profound impact on the continuous assessment mark assigned to the student. More so, frequent transfer of teachers from one school to the other may prove problematic for the affected teachers to fit into their new schools and cope with the prevailing continuous assessment practices. Continuous assessment places much power in the hands of teachers and this power is often abused by the teachers who award scores even when tests are not administered (Ughamadu, 1994). Another disadvantage of

CA is teacher overdependence on measuring students' progress in the cognitive domain in a school-based assessment with total neglect of the affective and psychomotor domains of learning. This problem is more serious in the higher or tertiary institutions where little or no effort is made to assess the students' affective domain of behaviour. Continuous assessment made its way into the Nigerian educational system as an idea muted at the first home-grown national curriculum conference of 1969 widely attended by who is who in the Nigerian education industry at the national and international levels. Its actual implementation as a reform policy aimed at improving the quality of teaching and learning assessment at all levels of education gained momentum following the massive examination malpractices that occurred in the West African Examination Council papers taken within the periods 1970 and 1977. Continuous assessment has since then become an important component of the Nigerian National Policy on Education (Federal Republic of Nigeria, 1977, 1981, 1998, 2004). The policy states that educational assessment and evaluation shall be liberalised by their being based in whole or in part on continuous assessment of the progress of the individual. The initiator of this concept in the Nigerian educational arena expected that the full implementation of CA in schools will not only reduce massive examination frauds that characterised both internal and external examinations in the second decade after Nigeria's independence in 1960 in the future, but promote students' meaningful learning in the three domains of cognitive, affective, and psychomotor. More so, the implementation of CA in the classroom is expected to afford the teachers opportunity to assess at a global level, the performances of the students more reliably, more comprehensively and more systematically.

However, different countries have different objectives for introducing CA in their schools. In Nigeria the main objective of introducing continuous assessment is not only to meet the demand for more comprehensive assessment systems that impact positively on learning achievement but to make it a quality control and assurance tool whose scores should form a substantial percentage of the final certificate examinations. According to the Ministry of Education and Culture (1993) of Namibia, the main objective/purpose of continuous assessment in Basic Education is to develop a reliable picture of each individual learner's progress and level of achievement in relation to minimum competencies specified in the subject syllabuses. The objectives of the CA programme are twofold in Zambia: firstly, to promote the use of formative assessment so as to improve the quality of learning and teaching and secondly, to establish a regular system of managing cumulative pupils' performance marks for purposes of using them in combination with final examination marks for selection and certification (Kapambwe, 2010). In Nepal, CA fulfils a major objective of improving the school promotion process or as an indicator of school quality which provides teachers with feedback about students' performance and achievement (Carnoy, cited in Mwebaza, 2010). Continuous assessment in Uganda fulfils the objective of creating excellence in the national external examination and teachers have had to rely on continuous assessment in order to monitor their students' academic progress and performance (Mwembaza, 2010).

Prior to the institution of continuous assessment in primary and secondary schools in 1977 following the adoption of the National Policy on Education, assessment of students' learning and performance in the pre-tertiary institutions in Nigeria was purely based on one-shot examinations usually administered at the end of the term or school year. More so, promotion of students from one level of education to the other was based on the result of the promotion examinations that usually came up at the end of each academic session (Atsumbe & Raymond, 2012) and teachers taught almost exclusively for the purpose of passing these examinations while students started with cheating of diverse sorts to pass the examinations, and the more daring learners, usually the more insecure students, were all out for live papers (Ipaye, 1982). However, the introduction of CA in Nigerian schools has rendered assessment school-based (Obioma, 2005) and summary judgments usually passed on the child's learning and achievement through the results of one-shot examinations (Atsumbe & Raymond, 2012) invalid. This in a bit has led to the improved evaluation of learners' attainment by ensuring that assessment is cumulative, systematic, comprehensive and guidance-oriented (Nneji, Fatade, Awofala & Awofala, 2012; Osokoya, 1996; Obioma, 1984; Ojerinde & Falayajo, 1984). In spite of this, observations continue to show that there are problems of the effective implementation of CA in Nigeria (Atsumbe & Raymond, 2012; Okpala, Onocha & Oyedeji 1993). The reintroduction of the universal basic education programme and the expansion of its scope from six to nine year basic education in 1999 brought a new dimension to continuous assessment in the form of School Based Assessment (SBA) otherwise called Assessment for Learning (AFL) at the primary and junior secondary school levels in Nigeria.

The need for SBA often considered wider than the CA is to improve the validity and reliability of pupils' assessment. Since it is based on multiple observations, assessments and monitoring of pupils' progress over a period of time, SBA provides a much more reliable indication of the true abilities of pupils than their performance on a "one-shot'' end of course test/examination (National Teachers' Institute, 2007). The move towards the implementation of SBA in Nigeria is reinforced by the full implementation of the nine-year Basic Education Curriculum (BEC) (NERDC, 2007) in September 2008 as a way of consolidating the nine-year Universal Basic Education programme (Awofala & Awolola, 2011a; Awofala & Awolola, 2011b; Awofala, Ola-

oluwa & Fatade, 2012; Awofala, 2012; Awofala, Olaoluwa & Fatade, 2013; Awofala & Sopekan, 2013). This provided the needed impetus for the Nigerian National Council on Education to approve a new National Frame work for conducting assessment in schools of which CA is a part. The adopted policy for the implementation of BEC brought about the following innovations in the assessment of students' learning at the primary and junior secondary school levels: (i) Pupils who successfully complete primary 6 will proceed to junior secondary school year one (JSS1) without a selective (placement) examination; (ii) Abolition of terminal examination for primary 6 pupils and scrapping of the central common entrance (placement) examination for primary 6 pupils into JSS1; (iii) Introduction of Basic Education Certificate Examinations (BECE) at the end of the 9-year basic education schooling to replace the Junior Secondary Certificate Examination; and (iv) Introduction of selective (placement) examination for graduating JSS students who are potentially bound for senior secondary (post basic) education. With these innovations, the National Continuous Assessment Framework for BEC provides opportunity for the assessment of primary and JSS students at the three levels of educational objectives: cognitive, affective, and psychomotor in which CA will be conducted three times within a term (usually 13 weeks) and the end-of term CA will be conducted three times within an academic session (usually one year).

Promotion of students from one class level to the other will be based on three terms weighted score for cognitive and psychomotor skills with an acceptable affective disposition and 60% of the weighted score will be allocated to school-based within term CA while the remaining 40% will be for end-of-term CA. A student is deemed to have passed a subject after securing at least 40% score in the core/elective subjects. Students' transition from primary six to JSS1 will be based on each level's or year's score starting from primary four to primary six and the weighted score is allocated as 10% in primary four, 20% in primary five, 30% in primary six and 40% within term SBA. With these rubrics in place, Nigerian classroom teachers are expected to promote pupils based on class records while the head teachers are expected to issue testimonials at the end of each year/term as may be applicable. Since there is no more entrance examination for primary six pupils seeking admission into the junior secondary school year one, the Ministry of Education in each state of the federation/private operators of primary schools are saddled with the responsibility of placing pupils in JSS 1 based on successful completion of primary six. It is expected that on successful completion of JSS 3, pupils will be awarded certificates based on their performance in the Basic Education Certificate Examinations which replaced the Junior Secondary Certificate Examination.

With these innovations in place, the Primary School Leaving Certificate formerly issued at the completion of primary six has ceased to be the minimum qualification for pupils rather the Basic Education Certificate Examinations is now the minimum qualification that pupils can obtain in the Nigerian educational system. In maintaining standard, the Inspectorate division in each state of the federation and the Federal Capital Territory, Abuja, is reinvigorated to quality assure the instruments for assessment, assessment procedures and standards. Unfortunately however, most teacher education programmes in Nigeria do not provide adequate training for prospective teachers on a wide range of strategies available for use in appropriate school based assessment (SBA) management of which continuous assessment (CA) is a part. More worrisome, is the dearth of literature on prospective teachers' attitudes towards CA. Most studies that investigated CA did so in conjunction with practicing teachers (Atsumbe & Raymond, 2012; Nneji, Fatade, Awofala, & Awofala, 2012; Iwu, Osuoha, Onoja, Oguwuike, & Egeruoh, 2012; Kapambwe, 2010; Hassan, 1994) and pre-tertiary students (Mwebaza, 2010; Obioma, 2010). Iwu, Osuoha, Onoja, Oguwuike and Egeruoh (2012) in a descriptive survey of attitude and awareness of teachers towards continuous assessment practice in tertiary institutions in Imo State, Nigeria found that test, assignment and project are the continuous assessment techniques frequently used to assess students while the attitude of the teachers toward continuous assessment varied depending on the capabilities of the teacher, support from the school and cooperation from the students. Abbas (2000) stated that the success and quality of continuous assessment depends to a large extent on the capabilities of the teacher, the support from the school authority and the co-operation of the students. Obioma (2010) examined in a large scale survey of 3,325 primary and junior secondary school teachers across the six geo-political zone of Nigeria the status, gaps and challenges of continuous assessment (CA) practices in Nigeria and found that in general school teachers demonstrated poor knowledge of the elementary concept of CA. Many teachers misapplied the CA instruments leading to more of continuous testing of learners instead of continuous assessment. CA guidelines not only varied across states and schools but were also different from the guidelines stipulated in the extant national CA handbook.

Nneji etal (2012) investigated the attitudes of 305 Science, Technology and Mathematics (STM) teachers towards assessment practices in Nigeria within the blueprint of descriptive survey research and findings showed that a higher proportional of the STM teachers seemed to display positive attitudes toward most of the assessment practices, while their attitudes toward some assessment practices tended to be either negative or neutral. More so, they found that gender, teaching experience and professional training might be factors in STM teachers' attitudes toward assessment practices. However, exploring preservice STM teachers' attitudes toward

CA in Nigeria is considered a worthwhile venture now that the Nigerian educational system is going through reforms in its programmes and curricula most especially at the primary and secondary school levels which could impact not only on the assessment standards at these levels of education but on the teaching and learning activities in the teacher education institutions in the country. Generally, Nneji etal (2012) noted that STM teachers differ in the degree of their attitudes toward assessment practices in the school setting and this may precipitate STM teachers developing dimensions of attitudes towards structured assessment practices which may have an impact on students' learning. This is because attitudes of teachers towards assessment practices could be related to the teaching methods employed by these teachers (Okpala & Onocha, 1985) and teaching methods more often than not impact students' learning (Awofala, Arigbabu & Awofala, 2013; Awofala, Fatade & Ola-Oluwa, 2012; Awofala, Balogun & Olagunju; Awofala, 2011; Akinsola & Awofala, 2009; Akinsola & Awofala, 2008). Fatade, Nneji, Awofala and Awofala (2012) identified the need to focus more research on the preservice science, technology and mathematics teachers since these groups of preservice teachers are sine qua non to nation building. Often times it is said "train the teachers, build the nation".

1.1 Research Questions

This study aimed to answer the following questions:

(1) What are preservice STM teachers' attitudes toward CA practices in secondary schools?

(2) Is there any difference between male and female preservice STM teachers in the attitudes toward CA practices in secondary schools?

(3) Is there any significant effect of age on preservice STM teachers' attitudes toward CA practices in secondary schools?

1.2 Null Hypothesis

One null hypothesis was tested:

 (1) Mode of entry, discipline of study and year of study taken jointly, are not significant predictors of preservice teachers' attitudes toward CA practices in secondary schools.

2. Methodology

The sample consisted of 339 participants (156 preservice science teachers: 83 males and 73 females; 164 preservice mathematics teachers: 82 males and 82 females; and 19 preservice technology teachers: 15 males and 4 females) from a conventional university in the southwest of Nigeria. Their ages ranged from 17 to 30 years with a mean age of 23.4 years and a standard deviation of 3.78. The preservice STM teachers could also be categorised as 32 sophomores, 201 juniors, and 106 seniors. More so, 231 were admitted through the unified tertiary matriculation examinations (UTME), 107 were admitted through direct entry mode while only one student came in through the professional diploma in science education. One instrument tagged Preservice STM Teachers' Attitude towards Continuous Assessment Practices Questionnaire (TATAPQ) adapted from Okpala and Onocha (1985) and modified by Nneji etal (2012) was used for data collection in this study.

The questionnaire composed of two sections: (a) demographic variables: age, gender, year of study, discipline of study, and mode of study and (b) consists of 39 statements made in various assessment practices (with 13 new statements added to the original 26 statements used by Nneji etal, 2012). Each statement is on a modified five-point Likert scale (anchored by 0: *undecided*, 1: *strongly disagree, 2: disagree, 3: agree* and 4: *strongly agree* for positive statements while the reverse is the case for negative statements with the weighting for undecided remains unchanged) in which preservice STM teachers were required to indicate the extent of their agreement or otherwise. The validity and reliability of the instrument passed through two stages. First, the questionnaire items were vetted by a number of specialists in STM Education who found out that the questionnaire was content valid. Second, the content validated questionnaire administered on the study sample showed no ambiguity in the questionnaire and produced a Cronbach coefficient alpha (for internal consistency reliability) of 0.724. The original 26 items had internal consistency reliability of 0.875 (Nneji etal, 2012).

More so, the exploratory factor analysis using the Principal Component Analysis with varimax rotation produced seven non-overlapping interpretable factor structures with high factor loadings (Table 1), eigen values greater than one and based on percent of cumulative variance and Cattel scree plot evidence. Together the four factors accounted for 38.37% of the total variance. The first factor accounted for 11.91% of the variance (eigenvalue= 4.53) and consisted of three mastery-approach goal orientation items. The second factor accounted for 21.54% of the variance (eigenvalue=2.59) and consisted of three performance-approach goal orientation items. The third factor accounted for 20.65% of the variance (eigenvalue = 2.41) and consisted of three mastery-avoidance goal orientation items. The fourth factor accounted for 17.66% of the variance (eigenvalue = 2.12) and consisted of three performance-avoidance goal orientation items.Also, inspection of the correlation matrix of the 39 items revealed that the correlations when taken overall were statistically significant as indicated by the Bartlett's test of sphericity, $\chi^2 = 1920.29; df=703; p<.001$ which tests the null hypothesis that the correlation matrix is an identity matrix. The Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) fell within acceptable range (values

of .60 and above) with a value of .70. Factors 1, 2, 3, 4, 5, 6, and 7 had internal consistency reliability coefficients of .705, .737, .724, .675, .704, .719, and .776 respectively.

The completion time for the 39 item questionnaire ranged between 20 to 25 minutes. The questionnaire was completed by the respondents under the guidance of the researchers and they were requested to indicate the extent of their agreement or otherwise on each of the assessment practices statements by marking on X on any of the scale points. Only actual numbers (N) and percentages (%) of participants, selecting each scale point (for each statement) were computed to get a general pattern of preservice STM teachers' attitude to continuous assessment practices. The scales were interpreted in such way that positive views on any assessment practice reflect positive attitude towards such a practice and vice-versa. To find out whether gender and age group differences existed in the preservice STM teachers' attitude towards assessment practices, the independent samples t-test and one-way Analysis of Variance (ANOVA) were adopted respectively. To answer the research question that bordered on the joint and relative contributions of pre-service STM teachers' demographic variables (discipline of study, year of study, and mode of entry) to the prediction of their attitudes toward CA, multiple regression analysis was applied.

3. Results

3.1 Research Question One: What are the preservice STM teachers' attitudes toward CA practices in secondary schools?

A total score was computed from the 39 items, the range being 39 to 156. A score of 97.5 is the middle point so higher scores indicate a positively strong attitudes toward CA. Of 339 preservice STM teachers, 94 (27.73%) had scores less than 98 (M=88.81, SD=8.13, score range: 58-97, 95%CI= 87.14–90.47), 11 had scores (3.24%) equaled 98 (M= 98, SD=0, score range: 98, 95%CI=98), while 234 (69.03%) had scores higher than 98 (M=114.01, SD=10.21, score range: 58-157, 95%CI= 104.93–108.08). A large proportion of these preservice STM teachers had high attitudes towards CA. In short, the overall M=106.50, SD=14.78, score range: 58-157, and 95%CI= 104.93–108.08 for the entire sample showed high attitudes toward CA of preservice STM teachers. Table 1 below reveals the over-all picture of preservice STM teachers' attitudes towards continuous assessment practices. Actual numbers and percentages for responses to each statement are shown in the table. The percentages are in parenthesis. The table revealed that more than 70 percent of the preservice STM teachers agreed/strongly agreed to such assessment practices, as testing students before teaching a new topic (item 1), giving examination and test scripts back to students after scoring (item 3), students assessing their own STM progress (item 4), making students' test result part of students' terminal and annual examination results (item 5), using students' individual activities as templates for assessing students' STM progress (item 6), using students' group activities as a template for assessing students' STM progress (item 7), and using students' rating in assessing the teaching effectiveness of STM teachers (item 8). More than 70 percent of the preservice STM teachers affirmed that preservice STM teachers informing students at the beginning of the term about: the number of the examinations or tests scheduled for the term (item 9), the topics on which examination and tests should be based (item 10), and the date for each test and examination (item 11). In addition, more than 55 percent of the preservice STM teachers agreed/strongly agreed to such assessment practices as making students' performances in STM tests and examination known to: other STM students in the school (item 13), parents of the students (item 14), all the teachers in the school (item 15), administrators outside the school (item 16), and auxiliary personnel in the school (e.g. laboratory assistants) (item 17). More than 65 percent of the preservice STM teachers agreed/strongly agreed to such assessment practices as gathering students' assessment data on STM using: multiple choice test (item 18), observational instruments (item 19), essay tests (item 20), rating scales (item 21), socio-metric instruments (item 22), Projects (item 23), laboratory practical (item 24), Structured quizzes (item 25), and anecdotal records (item 26).   In addition, more than half of the preservice STM teachers agreed/strongly agreed to such assessment practices as: secondary schools should use computer for students' records (item 27), There are no enough computers in secondary schools (item 28), and secondary schools should use computers to prepare and record students' results in my school (item 29) while barely 50% of the preservice STM teachers agreed/strongly agreed that: ICTs are not important when conducting CA in STM in secondary schools (item 30).

More than 75% of the preservice STM teachers agreed/strongly agreed to the conceptualisation of CA: as a formative evaluation procedure concerned with finding out, in a systematic manner, the over-all gains that a student has made in terms of knowledge, attitudes and skills after a given set of learning experience (item 31), making observations and collecting information periodically to find out what a student knows, understands and can do with the target of making an ongoing judgment about how well he/she is doing (item 32), carrying out at periodic intervals for the purpose of improving the overall performances of learners and of the teaching/learning process (item 33), and as an assessment carried out in an on-going process (item 34). More than 55% of the preservice STM teachers agreed/strongly agreed to such testing periods in CA as: weekly (item35), fortnightly

(item 36), monthly (item 37), and bimonthly (item 38). However, more than 60% of the preservice STM teachers disagreed/strongly disagreed to the termly testing period in CA (item 39). More so, barely 65% of the preservice STM teachers disagreed/strongly disagreed with the assessment statement as post-testing students after teaching any topic (item 2) while almost equal number of preservice STM teachers agreed/strongly agreed (42.8%) or indifferent (42.5%) on the statement that STM teachers informing students at the beginning of the term about: the type of instruments to be used in specific tests and examinations (e.g. essay tests, multiple choice test, laboratory practical) (item 12).

3.2 Research Question Two: Is there any significant difference between male and female preservice STM teachers in the attitudes toward CA practices in secondary schools?

Table 2 below showed that male preservice STM teachers recorded slightly higher mean score *(M=107.22, SD=15.09)* than their female preservice STM teachers *(M=105.95, SD=15.16)* on attitudes toward CA. However, this difference was not statistically significant (t=0.77, df=337, p=.441).

3.3 Research Question Three: Is there any significant effect of age on preservice STM teachers' attitudes toward CA practices in secondary schools?

The preservice STM teachers were classified according to the following age group: below 18 years, 18-25 years, and 26-30 years and Table 3 below showed that the descriptive statistics of these preservice teachers on attitudes toward CA according to age group. The preservice STM teachers within the age group 18-25 years recorded slightly higher mean score (M=107.21, SD=15.40, 95%CI.105.31-109.10) than their counterparts within the age group 26-30 years (M=106.09, SD=15.11, 95%CI.102.52-10.66) while those preservice STM teachers within the age group 26-30 years (M=106.09, SD=15.11, 95%CI.102.52-10.66) recorded higher mean score than their counterparts with age group below 18 years (101.84, SD=15.20, 95%CI. 95.57-108.11). However, these differences in mean scores of attitudes toward CA of preservice STM teachers according to age group were subjected to one-way ANOVA and the result in Table 3 below showed that there was no statistically significant effect of age group on preservice STM teachers' attitudes toward CA ($F_{(2, 338)}$= 1.48, p=.228). Therefore, it is concluded that age had no statistically significant effect on preservice STM teachers' attitudes toward CA.

3.4 Research Question Four: What are the joint and relative contributions of pre-service STM teachers' demographic variables (discipline of study, year of study, and mode of entry) to the prediction of their attitudes toward CA?

The results in Table 4 above showed the relationship between the demographic variables (gender, age, and year of study) and attitudes toward CA of preservice STM teachers. The outcome of the Pearson product moment correlation analysis indicated that preservice STM teachers' attitudes toward CA score significantly and positively correlated with discipline of study (Pearson r=.108, p=.024) but not significantly correlated with year of study (Pearson r=-.012, p=.413) and mode of entry (r=-.006, p=.456). The results in Table 5 above showed that the independent variables (discipline of study, year of study, and mode of entry) jointly contributed a coefficient of multiple regression of .109 and a multiple correlation square of .012 to the prediction of preservice STM teachers' attitudes toward CA. By implication, 1.2% of the total variance of the dependent variable (attitudes toward CA) was accounted for by the combination of the three independent variables. The results further revealed that the analysis of variance of the multiple regression data produced an *F*-ratio value non-significant at 0.05 level ($F_{(3,338)}$ = 1.35, *p*=257). The results of the relative contributions of the independent variables to the prediction of preservice STM teachers' attitude towards CA practices showed that only discipline of study made significant positive contribution to the prediction of preservice STM teachers' attitude towards CA practices (β = .109, *t* = 1.99, *p* = .046), while year of study and mode of entry made no significant contribution to the prediction of the dependent variable (β = -.016, *t* = -.301, *p* = .763; β = .007, *t* = -.134, *p* = .893) respectively.

4. Discussion

The results of the present study though in contrast with Obioma (2010) showed that a large proportion of the preservice STM teachers had high attitudes towards CA practices. They seemed to hold positive attitudes toward such assessment practices as testing students before teaching a new topic, giving examination and test scripts back to students after scoring, students assessing their own STM progress, making students' test result part of students' terminal and annual examination results, using students' individual activities as templates for assessing students' STM progress, using students' group activities as a template for assessing students' STM progress, and using students' rating in assessing the teaching effectiveness of STM teachers. These results are in tandem with the results of previous studies (Nneji etal, 2012) in which they claimed that the continuous assessment of what the student has gained from STM learning activities in terms of finite skills inherent in the cognitive, affective, psychomotor and perceptual domains gives the teachers greater involvement in the overall assessment of their students. The systematic and guidance oriented nature of continuous assessment, underscore the need for in-service STM teachers to engage in the practice of informing students at the beginning of the term about the

number of the examinations or tests scheduled for the term, the topics on which examination and tests should be based, and the date for each test and examination. In addition, the preservice STM teachers held strong views regarding such assessment practices as making students' performances in STM tests and examination known to: other STM students in the school, parents of the students, all the teachers in the school, administrators outside the school, and auxiliary personnel in the school (e.g. laboratory assistants). Aside the fact that these results are in favour of the guidance oriented characteristic of continuous assessment, the assessment practices are more likely to help the STM teachers in their efforts to guide students toward further academic success and enhanced career aspirations (Nneji etal, 2012). The comprehensiveness and systematic features of continuous assessment form the basis of testing for continuous assessment. These features, relied on such assessment practices as using multiple instruments to gather data from multiple sources, and informing students at beginning of the term about the number of examinations and tests scheduled for the term, the respective date for each test and examination, and the type of instruments to be used for the tests and examinations respectively. The positive attitudes shown by the preservice STM teachers towards these assessment practices support the effective implementation of continuous assessment in STM. Thus, such assessment practices will aid the integration of the entire continuous assessment procedure (in this case formative) with instructional processes Okpala and Onocha (1985) in STM thereby promoting the role of continuous assessment as a tool for monitoring and enhancing students' learning outcomes (Nneji etal, 2012). The results of this study showed that the preservice STM teachers held positive attitudes to such assessment practices as gathering students' assessment data on STM using: multiple choice test, observational instruments, essay tests, rating scales, socio-metric instruments, projects, laboratory practical, structured quizzes, and anecdotal records.

In addition, the preservice STM teachers held strong views regarding such assessment practices as: in my school we use computer for students' records, we don't have enough computers in my school, and we use computers to prepare and record students' results in my school. In spite of the importance of ICTs in education, the present study revealed that preservice STM teachers seemed divided regarding the importance of ICTs when conducting CA in STM. Regarding the conceptualisation of CA, the preservice STM teachers viewed CA: as a formative evaluation procedure concerned with finding out, in a systematic manner, the over-all gains that a student has made in terms of knowledge, attitudes and skills after a given set of learning experience. They referred to CA as making observations and collecting information periodically to find out what a student knows, understands and can do with the target of making an ongoing judgment about how well he/she is doing. The preservice STM teachers maintained that CA is carried out at periodic intervals for the purpose of improving the overall performances of learners and of the teaching/learning process. They also saw CA as an assessment carried out in an on-going process. Thus, the result of the present study showed that the preservice STM teachers showed good knowledge of the basic concept of CA. This result is in contrary to that of Obioma (2010) who in a large scale study found that vast majority of school teachers in Nigerian primary and junior secondary school demonstrated poor knowledge of the basic concept of CA.

Furthermore, results showed that the preservice STM teachers are not expecting inservice STM teachers to still be keeping the students' progress report cards manually rather they expected them to have gone computerised. This is because more than half of the preservice STM teachers claimed that secondary schools STM teachers should use computer for students' records, prepare and record students' results even though they agreed that there were no enough computers in secondary schools. However, the preservice STM teachers were sceptical on the importance of ICTs while conducting CA in secondary school STM. This is because barely half of the preservice STM teachers agreed/strongly agreed that: ICTs are not important when conducting CA in STM in secondary schools. The preservice STM teachers tended to hold positive attitudes regarding such testing periods in CA as: weekly, fortnightly, monthly, and bimonthly. However, the preservice STM teachers strongly opposed the termly testing period in CA. These results are in favour of the cumulative and periodic features of continuous assessment. Their negative attitudes to the termly testing period in CA could be that the termly assessment of students' learning outcomes in STM relates to one-short examination the reason for which the CA was introduced. More so, the preservice STM teachers opposed to the post-testing of students after teaching any topic while a good number of the preservice STM teachers were indifferent regarding STM teachers informing students at the beginning of the term about: the type of instruments to be used in specific tests and examinations (e.g. essay tests, multiple choice test, laboratory practical). These results indicated that the preservice STM teachers are yet to fully appreciate the instructional role of continuous assessment and this could be much more disturbing when one considers the vital role of such assessment practices to a successful implementation of continuous assessment in STM (Nneji etal, 2012). Effort should be made to sensitize the preservice STM teachers on the teaching-learning implications of such assessment practice as post-testing students after teaching a new topic. These preservice teachers should imbibe the idea of adopting post-testing for placement evaluation and for diagnosing students' difficulties in a sequence of STM instructions. Since continuous assessment is formative oriented, it is thus imperative that the preservice STM teachers develop positive attitude towards the

type of instruments to be used in specific tests and examinations (e.g. essay tests, multiple choice test, and laboratory practical) in STM instruction. The results of this study showed that gender and age had no statistically significant effect on preservice STM teachers' attitudes toward CA. The result on gender agreed partially with previous results (Nneji etal, 2012) in which they found no statistically significant effect of gender on most items of the assessment practices except for the assessment practice relating to using students' rating to assess teaching effectiveness of STM teacher.

Another outcome of this study was the joint contribution of the demographic variables (discipline of study, year of study, and mode of entry). The observed ($F_{(3,338)} = 1.35$, $p=257$) is a reliable evidence that the combination of the independent variables in the prediction of preservice STM teachers' attitudes towards CA was by chance since the F-ratio value was non-significant at 0.05 level. Although, the results showed that the independent variables (discipline of study, year of study, and mode of entry) jointly contributed a coefficient of multiple regression of .109 and a multiple correlation square of .012 to the prediction of preservice STM teachers' attitudes toward CA. By implication, 1.2% of the total variance of the dependent variable (attitudes toward CA) was accounted for by the combination of the three independent variables. Thus, there are other variables not considered in this study which could predict preservice STM teachers' attitude towards CA practices. The results of the relative contributions of the independent variables to the prediction of preservice STM teachers' attitude towards CA practices showed that only discipline of study made significant positive contribution to the prediction of preservice STM teachers' attitude towards CA practices while year of study and mode of entry made no significant contribution to the prediction of the dependent variable.

5. Conclusion

In summary, the findings of the present study have indicated the following important characteristics of the attitudes of preservice STM teachers toward continuous assessment practices. First, a higher proportion of the preservice STM teachers seemed to display positive attitudes toward most of the continuous assessment practices, while their attitudes toward some assessment practices tended to be either negative or neutral. Second, gender and age might not be potent factors in preservice STM teachers' attitudes toward continuous assessment practices. Third, the combination of the independent variables (discipline of study, year of study, and mode of entry) might not significantly contribute to the prediction of attitudes of preservice STM teachers toward continuous assessment practices, although discipline of study seemed to have made relative contribution to the prediction of preservice STM teachers' attitudes toward CA.

Based on the above and in line with previous studies results (Nneji etal, 2012), it is suggested that training for preservice STM teachers on continuous assessment practices should be based on the predetermined attitudes of preservice STM teachers toward the various assessment practices, and in situations where such attitudes tend to be negative or neutral, efforts should be made at directing the training programme in the teacher preparation institutions towards effecting changes in the observed negative or neutral attitudes in such a way that the preservice STM teachers, on completion of the training, would display positive attitudes that would conform to effective implementation of continuous assessment. In conclusion, future research may investigate the joint and relative contribution of other demographic variables of preservice STM teachers to the prediction of their attitudes toward continuous assessment practices.

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Table 1. General Pattern of Preservice STM Teachers' Attitude to Assessment Practices

Item	SA/A N(%)	U N(%)	SD/D N(%)	$\bar{x}$	StDev	Factor Loading
Indicate the extent of your agreement or otherwise to each of the following assessment practices **Scope of CA in STM**						
(1) Testing students before teaching a new topic	275 (81.1)	27 (8.0)	37(10.9)	3.16	1.259	.659
(2) Post-testing students after teaching any topic	105 (31.1)	14 (4.1)	220(64.9)	2.06	1.160	.592
(3) Giving examination and test scripts back to students after scoring	273 (80.6)	18 (5.3)	48(15.1)	3.09	1.086	.611
(4) Students assessing their own STM progress	273(80.6)	19 (5.6)	47(13.8)	3.03	1.060	.625
(5) Making students' test results part of students terminal and annual examination results	280 (82.6)	15 (4.4)	44(13.0)	3.07	1.059	.515
(6) Using students' individual activities as a template for assessing students' STM progress	100 (29.5)	25 (7.4)	214(63.1)	1.93	1.110	.652
(7) Using students' group activities as a template for assessing students' STM progress	245 (72.2)	22 (6.5)	72(21.2)	2.83	1.180	.611
(8) Using students' rating in assessing the teaching effectiveness of STM teachers	242 (71.4)	61(18.0)	35(10.3)	2.75	1.492	.529
STM teachers informing students at the beginning of the term about:						
(9) The number of examinations or tests scheduled for the term	268 (79.1)	21 (6.2)	50(14.8)	3.04	1.157	.605
(10) The topics on which examinations and tests should be based	250(73.7)	20 (5.9)	69(20.4)	2.91	1.122	.604

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(11) The respective dates for each test and examination	244 (72.0)	34 (10.0)	61(18.0)	2.88	1.310	.653
(12) The type of instruments to be used in specific tests and examinations (e.g. essay tests, multiple choice test, laboratory practical)	145 (42.8)	144(42.5)	50(14.8)	1.77	1.711	.552
Making students performances in STM tests and examinations known to:						
(13) Other STM students in the school	226 (66.6)	34 (10.0)	79(23.3)	2.79	1.304	.597
(14) Parents of the students	250 (73.7)	16 (4.7)	73(21.6)	3.01	1.153	.589
(15) All the teachers in the school	232 (68.4)	18 (5.3)	89(26.2)	2.83	1.164	.642
(16) Administrators outside the school	214(63.2)	31 (9.1)	94(27.7)	2.71	1.305	.565
(17) Auxiliary personnel in the school (e.g. laboratory assistants)	202 (59.6)	69 (20.4)	67(19.7)	2.51	2.300	.525
Gathering students' assessment data on STM using:						
(18)Multiple choice (objective) tests	257 (75.8)	18 (5.3)	63(18.6)	2.97	1.121	.485
(19)Observational instruments	275 (81.2)	18 (5.3)	46(13.6)	3.01	1.089	.561
(20) Essay tests	260 (76.7)	16 (4.7)	62(18.3)	2.95	1.059	.610
(21) Rating scales	261 (77.0)	19 (5.6)	56(16.5)	3.02	2.039	.554
(22) Sociometric instruments	256 (75.5)	22 (6.5)	60(18.7)	2.90	1.142	.589
(23) Projects	261 (77.0)	22 (6.5)	54(15.9)	2.98	1.168	.554
(24) Laboratory practical	246(72.5)	22 (6.5)	69(20.4)	3.04	2.479	.528
(25) Structured quizzes	255 (75.2)	25 (7.4)	59(17.4)	2.87	1.182	.512
(26) Anecdotal records	228 (67.2)	43 (12.7)	68(20.0)	2.62	1.326	.629
Use of ICT for CA in STM						
(27) Secondary schools STM teachers should use computer for students' records	236 (69.6)	26 (7.7)	76(22.4)	2.89	1.303	.601
(28) There are no enough computers in secondary school	183 (53.9)	18 (5.3)	138(40.7)	2.53	1.301	.636
(29) Secondary schools STM teachers should use computers to prepare and record students' results	230(68.0)	26 (7.7)	82(24.3)	2.95	1.983	.445
(30) ICTs are not important when conducting CA in STM in secondary schools	170 (50.3)	28 (8.3)	140(41.4)	2.41	1.316	.520
Conceptualisation of CA						
(31) CA is a formative evaluation procedure concerned with finding out, in a systematic manner, the over-all gains that a student has made in terms of knowledge, attitudes and skills after a given set of learning experience	261 (77.0)	27 (8.0)	51(15.1)	3.05	1.271	.646
(32) Continuous assessment refers to making observations and collecting information periodically to find out what a student knows, understands and can do with the target of making an ongoing judgment about how well he/she is doing	275 (81.1)	12 (3.5)	52(15.4)	3.20	1.040	.697
(33) Continuous Assessment is carried out at periodic intervals for the purpose of improving the overall performances of learners and of the teaching/learning process	268 (79.1)	24 (7.1)	47(13.8)	3.08	1.175	.589
(34) Continuous assessment as an assessment carried out in an on-going process	262 (77.3)	24 (7.1)	53(15.6)	3.00	1.199	.553
Testing Period in CA						
(35) Weekly	233 (68.7)	29 (8.6)	77(22.7)	2.83	1.302	.634
(36) Fortnightly	212 (62.5)	23 (6.8)	104(30.7)	2.65	1.223	.668

(37) Monthly	*224 (66.1)*	*25 (7.4)*	*90(26.5)*	*2.77*	*1.247*	*.637*
(38) Bi-monthly	*203 (59.9)*	*25 (7.4)*	*111(32.7)*	*2.61*	*1.267*	*.601*
(39) Termly	*111 (32.7)*	*23 (6.8)*	*205(60.5)*	*2.64*	*1.222*	*.620*

Table 2. Means, standard deviations, and t-test value on Attitudes toward CA score of Preservice STM Teachers According to Age group

Gender	N	Mean	SD	df	t	P
Male	179	107.22	15.09	337	.771	.441
Female	160	105.95	15.16			

Table 3. One-way ANOVA on Attitudes toward CA score of Preservice STM Teachers According to Age group

	Sum of squares	Df	Mean Square	F	Sig.
Between groups	675.96	2	337.98	1.48	.228
Within groups	76535.95	336	227.79		
Total	77211.91	338			

Table 4. Correlations Matrix for the Relationship between demographic variables (discipline of study, year of study, and mode of entry) and Preservice STM teachers' attitudes toward CA

	Mean	SD	1	2	3	4
1. CA score	106.61	15.11	1.00	.108*	-.012	1.006
2. Discipline of study	1.60	.60	.108*	1.00	.038	.008
3. Year of study	2.22	.600	-.012	.038	1.00	-.029
4. Mode of entry	1.32	.47	-.006	.008	-.029	1.00

*p<.05

Table 5. Model Summary, Coefficient and t-Value of Multiple Regression Analysis of Demographic variables and Outcome Measure (Attitudes toward CA)

Model Summary
Multiple R = .109
Multiple R^2 = .012
Multiple R^2 (Adjusted) = .003
Standard Error Estimate = 15.09
F = 1.35, p>.05

Model	Unstandardized Coefficients		Standardized Coeff.	t	Sig
	B	Std. Error	Beta		
(Constant)	103.497	4.435		23.34	.000
Discipline of study	2.717	1.36	.109	1.99	.046
Year of study	-.412	1.37	-.016	-.301	.763
Mode of entry	-.232	1.73	.007	-.134	.893

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