TEACHER QUALIFICATION AND TEACHING EXPERIENCE AS PREDICTORS OF TEACHERS' FORMATIVE ASSESSMENT PRACTICES AMONG BIOLOGY TEACHERS IN ENUGU STATE

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Abstract
This study investigated teachers' qualification and teaching experience as predictors of formative assessment practices among Biology teachers in secondary schools in Enugu State. The study had three specific purposes, three research questions and three null hypotheses. Correlational survey research design was employed. The population comprised 573 Biology teachers ín Enugu State while the sample consisted of 87 Biology teachers and was determined using multistage sampling procedure. Biology teachers' assessment practices questionnaire (BTAPQ) was used in collecting data and was face validated by two experts in research measurement and evaluation unit and one expert in Biology education unit all in the Department of Science Education, University of Nigeria, Nsukka. Internal consistency reliability estimate was determined using Cronbach alpha method and it yielded an estimate of .86. The results showed that all the predictor variables correlated highly and positively and were all significant. Based on the findings, recommendations and implications of the study were stated.

Keywords: Teacher, Teacher qualification, Teaching experience, Assessment, Formative assessment, Biology

Introduction

Education plays a crucial role in shaping the intellectual and overall development of individuals. It is one of the ways through which the society can be empowered. It is the instrument that launches any nation into science and technology with the consequential hope of improved living conditions, human advancement and national development. Malangtupthong, Phayaphrom and Nurittamount (2022) supported this view by saying that education promotes analytical and quantitative skills as well as enhances critical thinking. Teachers are the strength of every nation and the pivot upon which the sources of all classroom. Educational practices revolve. They empower students by inculcating life-long skills and know- how thereby giving them the capacity to function effectively in the society. The teacher provides education to students and can be regarded as one who instructs another and to create positive influence on the students. Teachers help students to acquire knowledge, competencies or values in order for them to learn. They also offer guidance and dedication and give young people the power of education. Okeke, Enyi, Agu, Chigbu and Nwankwo (2019) defined the teacher as a person who had undergone approved professional training in education at appropriate levels and is capable of imparting knowledge, attitude and skills to learners.

Teachers teach many subjects in secondary schools and Biology is one of them. The national policy on education (FRN, 2013) emphasized on the study of Biology to be able to understand the world and the activities of living things which are plants and animals. Michael (2018) defined Biology as the study of life. It provides a detailed explanation for the interactions that occur among living things. The study of Biology

also helps students to develop practical skills. Ude (2011) stated that the knowledge of Biology makes secondary school students well informed and motivated to assume roles in which the practical and theoretical aspects are used in unravelling some basic problems of life. There are many characteristics which may aid the teacher in imparting knowledge to the learners. These include qualification, years of teaching experience, positive attitude, lecturer-students relationship, communication skills, listening, collaboration, empathy, patience, understanding, classroom management, skills, being creative, being fair, sense of humour, etc. According to Anyiam and Ene (2021), the particular attributes of the teacher which aid him in the classroom include qualification, experience, socio-economic status, health condition, gender, age. Also, Kosgei, Mise, Odera and Ayugi (2013) stated that it could also include interpersonal relationship with students, teachers' knowledge of subject matter and professional development. Keiler (2018) said that students and teachers in twenty first century STEM classrooms face significant teaching and learning challenges in preparing post- secondary education, career and citizenship. The challenges could arise from lack of proper professional training and teachers' teaching experience. It is believed that teachers' behaviour in the classroom is complemented by the teachers' qualification and attitude towards formative assessment. These challenges could arise from lack of proper professional training and teachers' teaching experience. There is, therefore, the need to review teachers' qualification and experience as predictors of teachers' assessment practices.

Teachers' qualification is one of the academic and professional degrees that enables a person to become a registered teacher. It is in the programmes that the teacher is inculcated with the mastery of content knowledge and the importance of mastery of pedagogical knowledge. Antony, Paidi, Paradana, Hapsari and Astuti (2019) stated that teacher qualification can mean all the skills teachers need to teach effectively and that it focused on academic degrees that a teacher must have as his teaching requirements. Ibe, Nworgu and Anyaegbunam (2016) stated that teachers' qualification could mean credentials and knowledge teachers possess before they enter the classroom, such as grades subject-matter education, degrees, certificates and evidence of participation in continued learning. The categories of the levels of teachers qualification which teachers possess include Ph.D, M.Ed, B.Ed and NCE usually in the teacher's subject area. Abe and Adu (2013) opined that one of the most important factors in improving students' academic achievements in schools is employing seasoned academically qualified teachers in all schools. The assumption is that these teachers engage students in activities like formative assessment, which will enhance academic achievement. Goldhaber and Brewer (2000) believe that higher degree shows a positive correlation with student academic achievement. The teachers who have more training produce students who have better achievements. According to Darling-Hammond, Berry and Thorenson (2001), years of teacher experience is one indicator of teachers' qualifications which is believed to be a significant determinant of students' academic performance.

It is believed that teacher experience is an indicator of teacher quality. Teachers' experience can be regarded as the number of full-time classroom teaching experience a teacher has in the classroom setting (Anyiam & Ene, 2021). Teacher experience may vary with the number of years put into teaching in the classroom. It is believed that the teacher experience should increase with the number of years the teacher has put in the classroom and subsequently, the formative assessment practices of the teacher. Ijaiya (2000) noted that experience improved teaching skills while students learn better under the tutelage of teachers who have taught continuously over years. Ladd (2018) agreed that teachers with greater years of experience are often just marginally more effective than those with only five years teaching experience because beyond a certain point, a

teacher's years of experience starts to lose some of their impact. Teachers' experience is very crucial because the teacher is responsible for translating policy into action and the principles based on practice during interaction with students and experience gained while interacting with the students matter a lot in imparting knowledge. Based on the conflicting results and views of the researchers, this study investigated the predictive power of teachers' qualification and teaching experience on teacher formative assessment in the classroom.

Good assessments provide necessary feedback required in order to maximize the outcome of educational efforts. Nworgu (2015) defined assessment as a systematic process of gathering data from a variety of sources in order to understand, describe and improve learning. It is a process of collecting, arranging and analysing data for improvement of teaching and learning. Assessment is an interaction between teachers and learners based on stated objectives (Nsikak-Abasi, Udoudoh & Eme, 2019). Nworgu further said that assessment can be summative or formative.

Formative assessment or assessment for learning is that type of assessment that is carried out while the programme is still ongoing. It is diagnostic and provides feedback to teachers and students over the course of instruction. Asare (2021) defined formative assessment as the frequent interactive assessment of students' progress and understanding to identify learning needs and adjust teaching appropriately. Formative assessment is a systematic process to continuously gather information and provide feedback about learning while instruction is ongoing. (Onoja & Ene, 2021 & Vingale, 2014) It provides immediate feedback to teachers and students in order to plan remedial action before the completion of the course or programme so that action can be taken to close any gap that may have occurred during the lesson. Substancial learning gains are possible when teachers use formative assessment in their classroom practice. Vingale further identified five key strategies which may be regarded as the functions of formative assessment as clarifying and sharing learning intentions and criteria for success, providing feedback that moves learners forward, engineering effective classroom discussions, questions and learning tasks that elicit evidence of learning, activating students as instructional resources for one another and activating students as owners of their own learning. Arrafii and Sumarni (2018) argued that heavy workload for the teachers for applying the formative assessment is one of the barriers to successful formative assessment. Thus, instead of giving the attention to achieve the intended learning goals, the teachers are busy emphasizing on strategies to help the students to pass the external examination. This may prevent them from proper implementation of formative assessment in the classroom.

Despite the importance of formative assessment, teachers are still not practicing it the way it should be practiced. To support this, Orji (2017) stated that teachers assessment practices have failed to bring out the desired performance in students while Arrafii and Suhaili (2015) said that the teachers' understanding of formative assessment to bring out the desired performance in students is inadequate. Many of them lack the formative assessment skills while some teachers even teach without inculcating formative assessment practices in their teaching, forgetting that it is aimed at helping students to learn. It is therefore, necessary to investigate the formative assessment practices of teachers.

Some studies have been conducted on formative assessment, teacher qualification and teaching experience. Tigelaar and Sins (2021) carried out an experimental study on effect of formative assessment programmes on teachers' knowledge about supporting students' reflection in Netherlands. Results showed among others that teachers in the self-assessment programme showed a modest decrease in

scores on their knowledge measure. However, this decline was not significant. In another study, Agah, Oguguo, Ene, Asor and Andor (2022) discovered that the magnitude of all the estimated direct effects of lecturers' and students' characteristics, such as lecturers' experience, lecturers' competence in projects/thesis supervision, teacher-students relationship among others on postgraduate students' acquisition of research skills were statistically significant. None of the reviewed research studied the joint predictive power of teacher qualification and teaching experience on teacher formative assessment. There is need for this research since formative assessment has relationship with teacher qualification and teaching experience.

Statement of the problem

Research has indicated that teachers' assessment practices have failed to bring out the desired performance in students. Therefore, there is need to review teachers' qualification and teaching experience as predictors of Biology teachers' formative assessment practices in secondary schools in Enugu State to see the amount of variation of these predictor variables on formative assessment.

Purpose of the Study

The purpose of this study was to determine the predictive power of teacher qualification and teaching experience on Biology teachers' formative assessment practices in Enugu state. Specifically, the study determined the

1. Predictive power of teachers' qualification on secondary school Biology teachers' formative assessment practices
2. Predictive power of teachers' teaching experience on secondary school Biology teachers' formative assessment practices
3. Joint predictive power of teachers' qualification and teaching experience on Biology teachers' formative assessment practices

Research Questions

1. What is the predictive power of teachers' qualification on Biology teachers' formative assessment practices?
2. What is the predictive power of teaching experience on Biology teachers' formative assessment practices?
3. What is the joint predictive power of teacher qualification and teaching experience on Biology teachers' formative assessment practices?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. The predictive power of teacher qualification on Biology teachers' formative assessment practices is not significant.
2. The predictive power of teaching experience on Biology teachers' formative assessment practices is not signification.
3. The joint predictive power of teacher qualification and teaching experience on Biology teachers' formative assessment practices is not significant.

Method

A correlational survey research design was adopted for this study. The population comprised 573 Biology teachers in public secondary schools in the six education zones in Enugu State. The sample comprised 87 Biology teachers. Multi-stage sampling procedure was used in drawing the sample. The first stage comprised using simple random sampling technique specifically balloting with replacement method to draw three education zones out of the six education zones. The education zones are Enugu, Udi and Agbani. The second stage involved using the same method of simple random sampling technique to draw three Local government areas, one from each zone. During the third stage, 10 schools were drawn from each LGA using purposive random sampling technique. This gave a total of 30 public secondary schools for the study. Lastly purposive sampling technique was used to draw all Biology teachers in the 30 public secondary schools at the time of administration of the instrument. This gave a total of 87 Biology teachers. The instrument was a researcher constructed questionnaire titled Biology teachers' formative assessment practices questionnaire (BTFAPQ). It has two sections A and B. Section A covered the demographic data of the teachers (qualification and years of teaching experience) while section B contained 28 items on Biology teachers' formative assessment practices. The instrument is a likert type instrument with four response options of strongly agree (SA), Agree (A), Disagree (DA) and strongly Disagree (SD). The rating scale for the options are SA = 4, A = 3, D= 2 and SD = 1. The BTFAPQ was face validated by two experts in research, measurement and evaluation unit and one expert in Biology education unit all in Faculty of Education, University of Nigeria, Nsukka. The internal consistency index of the instrument was determined using Cronbach alpha method. It yielded an internal consistency reliability estimate of .87 which shows that the instrument was reliable. Method of data collection was face to face administration of the instrument to the biology teachers in the schools by the research assistants. This allowed for easy retrieval of the instrument. All the research questions were answered using point biserial correlation while the hypotheses were tested at 0.05 level of significance also using point biserial correlation.

Results

Research Question One: What is the predictive power of teachers' qualification on Biology teachers' formative assessment practices?

Table 1: regression analysis of the predictive power of teachers' qualification on Biology teachers' formative assessment practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.893[a]	.797	.097	14.45646

a. Predictors: (Constant), Teacher Qualification

The result in Table 1 shows the predictive power of teachers' qualification on Biology teachers' formative assessment practices. The result revealed the correlation

coefficient (r) of .893 was obtained for the predictive power of teachers' qualification on Biology teachers' formative assessment practices. The result shows that teachers' qualification highly and positively predicts their formative assessment practices. A coefficient of determination (r^2) of .797 means that 79.7% of teachers, formative assessment practice is attributed by their academic qualifications.

Hypothesis One

The predictive power of teacher qualification on Biology teachers' formative assessment practices is not significant.

Table 2: ANOVA analysis of the predictive power of teacher qualification on Biology teachers' formative assessment practices

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2146.911	1	2146.911	10.273	.002[b]
	Residual	17764.078	85	208.989		
	Total	19910.989	86			

a. Dependent Variable: Formative_ Ass _Pract
b. b. Predictors: (Constant), Teacher Qualification

The result in Table 2 shows the ANOVA analysis of the predictive power of teacher qualification on Biology teachers' formative assessment practices. The result revealed that the predictive power of teacher qualification on Biology teachers' formative assessment practices yielded an F-ratio of 10.273 with an associated probability value of .002. The probability value of .002 is less than 0.05 level of significance set as the benchmark for taking decision. This is an indication that the predictive power of teacher qualification on Biology teachers' formative assessment practices is significant.

Research Question Two: What is the predictive power of teaching experience on Biology teachers' formative assessment practices?

Table 3: regression analysis of the predictive power of teaching experience on Biology teachers' formative assessment practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.778[a]	.605	.263	13.06588

a. Predictors: (Constant), Years_of_Teaching_Exp.

The result in Table 3 shows the predictive power of years of teaching experience on Biology teachers' formative assessment practices. The result revealed the correlation

coefficient (r) of .778 was obtained for the predictive power of years of teaching experience on Biology teachers' formative assessment practices. The result shows that years of teaching experience highly and positively predicts their formative assessment practices. A coefficient of determination (r^2) of .605 means that 60.5% of teachers, formative assessment practices is attributed by their years of teaching experience.

Hypothesis Two

The predictive power of teaching experience on Biology teachers' formative assessment practices is not signification.

Table 4: ANOVA analysis on the predictive power of teaching experience on Biology teachers' formative assessment practices

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5400.031	1	5400.031	31.631	.000[b]
	Residual	14510.957	85	170.717		
	Total	19910.989	86			

a. Dependent Variable: Formative_Ass_Pract

b. Predictors: (Constant), Years_of_Teaching_Exp

The result in Table 4 shows the ANOVA analysis of the predictive power of years of teaching experience on Biology teachers' formative assessment practices. The result revealed that the predictive power of years of teaching experience on Biology teachers' formative assessment practices yielded an F-ratio of 31.631 with an associated probability value of .000. The probability value of .000 is less than 0.05 level of significance set as the benchmark for taking decision. This is an indication that the predictive power of years of teaching experience on Biology teachers' formative assessment practices is significant.

Research Question Three: What is the joint predictive power of teacher qualification and teaching experience on Biology teachers' formative assessment practices?

Table 5: regression analysis of the joint predictive power of teacher qualification and teaching experience on Biology teachers' formative assessment practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.918[a]	.843	.322	12.52586

a. Predictors: (Constant), Years_of_Teaching_Exp, Teacher_Qualification

The result in Table 5 shows the joint predictive power of teacher qualification' and years of teaching experience on Biology teachers' formative assessment practices. The result revealed the correlation coefficient (r) of .918 was obtained for the joint predictive power of teacher qualification and years of teaching experience on Biology teachers' formative assessment practices. The result shows that teachers' qualification and years of teaching experience highly and positively predicts their formative assessment practices. A coefficient of determination (r^2) of .843 means that 84.3% of teachers, formative assessment practices is attributed by their qualification and years of teaching experience.

Hypotheses Three

The joint predictive power of teacher qualification and teaching experience on Biology teachers' formative assessment practices is not significant.

Table 6: ANOVA analysis of the joint predictive power of teacher qualification and teaching experience on Biology teachers' formative assessment practices

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6731.617	2	3365.808	21.452	.000[b]
	Residual	13179.372	84	156.897		
	Total	19910.989	86			

a. Dependent Variable: Formative_Ass_Pract
b. Predictors: (Constant), Years_of_Teaching_Exp, Teacher_Qualification

The result in Table 6 shows the ANOVA analysis of the joint predictive power of teachers' qualification and years of teaching experience on Biology teachers' formative assessment practices. The result revealed that the joint predictive power of teachers' qualification and years of teaching experience on Biology teachers' formative assessment practices yielded an F-ratio of 21.452 with an associated probability value of .000. The probability value of .000 is less than 0.05 level of significance set as the benchmark for taking decision. This is an indication that the joint predictive power of teachers' qualification and years of teaching experience on Biology teachers' formative assessment practices is significant.

Discussion

The findings of this study revealed that teachers' qualification had a high positive correlation with teachers' formative assessment practices and further revealed that the predictive power of teacher qualification on Biology teachers' formative assessment practices was also significant. This implies that the teachers had adequate educational qualification and had the required ability to impart knowledge through formative assessment practices. This agreed with the finding of Yusuf and Abdullahi

(2016) that a significant relationship exists between teaching qualifications and teachers' formative assessment practices. The findings of the present study also agreed with the findings of Antony, Paidi, Paradana, Hapsari and Astuti (2019) that the teachers had the professional qualification for teaching Biology and are therefore expected to correctly practice formative assessment. They also discovered that additional professional qualification outside the minimum level did not lead to increased formative assessment practice.

However, Tigelaar and Sins (2021) discovered that knowledge scores of teachers in their expertise assessment programme showed a non-significant increase. Agah, Oguguo, Ene, Asor and Andor (2022) said that the magnitude of all the estimated direct effects of lecturers and student characteristics were statistically significant but there was no significant disparity in the performance of students taught by lecturers who differed in teaching qualification. Huang and Moon (2009) also discovered significant disparity in the performance of students taught by lecturers who differed in their teaching qualifications. Arrafii and Sumarni (2018) discovered poor teacher understanding of formative assessment. They explained that the low level of teachers' literacy of formative assessment may be explained by lack of further training on assessment literacy and practice. Findings of this study further revealed that teaching experience also has high positive correlation with Biology teachers' formative assessment practices. The predictive power of teaching experience on Biology teachers' formative assessment practices was also significant. This could be because the teacher is responsible for translating policy into action and the principles based on practice during interaction with students and experience gained while interacting with the students matter a lot in imparting knowledge. Antony et al (2019) discovered no significant influence of teaching experience on the ability of Biology teachers to implement the Technical Pedagogical Content Knowledge (TPACK). Ladd and Sorensen (2015) argued that experience is not crucial to teachers' effectiveness while Ladd (2018) observed that teachers with greater years of teaching experience are often just marginally more effective than those with only five years teaching experience and that beyond a certain point, a teacher's years of experience start to lose some of their impact. Ene, Anyiam and Onoja (2022) discovered significant influence of teachers' years of teaching experience on students' mean academic achievement of Basic Science students. The joint predictive power of teaching qualification and teaching experience also had high positive correlation. Therefore, a significant positive correlation existed among the variables.

Conclusion

Formative assessment has been a popular discourse in education, but its potential benefit is fundamentally dependent on teachers' willingness to make changes to their classroom practices. These changes being about much assessment tension. It should be noted that how well teachers experience and manage their assessment tension determines the efficacy of their formation assessment practices.

Implications of the study

1. The result of the study showed that teachers' qualification has significant relationship with teachers' formative assessment practise. This implies that teacher qualification is a significant factor in predicting teachers' formative assessment practices.

2. Teachers' years of teaching experience has significant relationship with teachers' formative assessment practices. This implies that teachers' teaching experience is a significant factor in predicting teachers' formative assessment practices.

Recommendations

1. Teachers should employ the use of formative assessment practices while teaching in order to make teaching more effective.
2. Employers of labour especially at the senior secondary school level should consider teaching experience while employing teachers.
3. Government should organise workshops for serving teachers on formative assessment practices to help them understand the importance of adopting formative assessment practices while teaching.

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