

BASIC EDUCATION TEACHERS' COMPETENCY LEVEL IN ASSESSMENT FEATURES AND COMPETENCE ATTAINMENT AMONGST PRIMARY SCHOOLS PUPILS IN SAA SUBDIVISION OF CAMEROON

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Abstract:

This study assessed basic education teacher's level in competency assessment features towards competence attainment amongst primary schools pupils in Saa subdivision of Cameroon. The population of basic education teachers in Saa subdivision is 275. The sample for the study was 79 teachers (30 males and 49 females). They were selected based on proportional stratified random sampling. Three research questions guided the study. Survey research design was adopted for the study. The researcher developed a teacher's questionnaire titled "Basic Education Teachers' Level in Competency Assessment Features" (BETLCAF) that was used as the data collection instrument. The instrument consisted of two Parts: A and B. **Part A: Teacher's demographic information (TDI).** **PART B** had three sub-sections that asked questions on the variables of the study. In Part B, Section A covered items 1 to 7 to assess basic education teachers' skills in designing assessment criteria. Section B had 8 items which assessed basic education teachers' mastery of evidence-based competency assessment forms. Section C had 10 items which assessed basic education teachers' strategies for communicating progress that support the learning process and pupils' success. The response format of each section was on 5 point Likert scale and weights, as thus: Highly Competent (HC= 5 points), Competent (C= 4 points); Moderately competent (M C= 3points); Low Competent (LC= 2 POINTS) and Not Competent (NC= 1point). Data were analyzed through the median rating score. The maximum score for all the items is 125 marks, while minimum score is 25 marks. Total score of each item was taken as the index of assessment of basic education teachers' level in competency assessment features in Saa subdivision of Cameroon. The instrument was validated by an expert in Test and Measurement. The reliability coefficient of 0.84 was established using Cronbach's alpha. Social constructivist theory of Lev Vygotsky (1896-1934) was the theoretical framework adopted for the research. Findings of the study revealed that most teachers are competent in the ability to design skills in assessment criteria and strategies for communicating progress that support the learning process and pupils' success. However most teachers are not yet competent in the ability to use evidence-based competency assessment forms, such as to monitor Mathematics project, use computer-assisted test, set complex integration situations, observe pupils' attitudes through checklists, and involve pupils in self-assessment. The study recommended that schools administrators should organise further training workshops and conferences, seminars, symposia regularly with a view to updating teachers already on the field with the building capacity of competency-based evaluation system for the use of evidence-based competency assessment forms. Government should equip schools with computer centres with internet connection that will serve teachers as e-learning libraries. New teachers training college curricula should be drafted to effectively respond to the changing needs of competency-based assessment features.

Keywords: Assessment, Competency assessment features, Teacher competency

Introduction

In 2018/2019 academic year, Cameroon's Ministry of Basic Education (MINEDUB) adopted an immediate implementation of Competence-Based Pedagogy (CBP), otherwise called pedagogy of intergration (PI) which replaced the Objective-Based Pedagogy (OBP), otherwise formally called the conventional knowledge-based approach. Earlier in 1970s, De Ketele was

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still an active advocate of the American movement of the pedagogy by objectives that he tried to disseminate and popularise in French universities (De Ketele, 2000); nevertheless, he quickly perceived the limits of teaching discrete objectives, since the conventional knowledge-based approach encouraged pupils to reproduce theoretical knowledge and memorize facts. Consequently, in 1980, De Ketele suggested the concept of “Objectif Terminal Global”, which has later come to be termed as “Objectif Terminal d’Integration” (De Ketele, 1980 as cited in Roegiers, 2001, p. 84). The notion of terminal objective of integration has been operationalized by BIEF under the label ‘Approche Par les Compétences’ in French appellation (APC) or *pédagogie de l’ integration* respectively in English Competency-Based Approach (CBA) or pedagogy of integration (Roegiers, 2010). Indeed, in review of the background of the competence-based approach or pedagogy of integration, researchers such as Hirtt (2009), Peyser et al. (2006), and Roegiers (2008) confront the claims of these competency-based teaching models. Peyser et al. (2006) identify two main integration schools of thought, the Anglo-Saxon and the Francophone. The major differences between these schools of thoughts relate to the way they conceptualize skill integration and transfer. According to him, the Anglo-Saxon integration framework is based on the reconstruction of the already mastered skills and knowledge to perform a real world task at the end of instruction, the aim of which is to acquire real life and survival skills; the Anglo-Saxon pedagogical community argues that students cannot integrate skills and knowledge until they are fully mastered. With regard to the Anglo-Saxon competency-based framework, the concept of competency does not include its applications to novel situations. Meantime, the Francophone school holds that, students can learn to integrate and transfer skills by solving similar tasks in different contexts within the classroom. The Francophone model provides syllabus designers the opportunity to start with preliminary work on resources before inviting learners to solve complex tasks (Roegiers, 2010). For Roegiers (2007), a curriculum is structured into two major phases: The first stage, learners work on enabling skills before facing them up with complex situations; whereas, in the second stage, they start tackling complex tasks, and consequently acquire and master the skills and knowledge intrinsic to the target task simultaneously. Roegiers (2007, 2010) conceptualizes pedagogy of integration round the integrative teaching/learning models called “situations-as-starting points” and “situations-as-end points”(Roegiers, 2010, pp. 77-78). However, Roegiers (2007) acknowledges that the two models are two sides of the same coin, he underscores the fact that integration situations-as-end points model is more appropriate for developing countries that suffer from lack of teacher training and didactic materials. However, Hirtt,N (2009) fails to recognise the differences between the Anglo-Saxon competency-based approach(CBA) and the Francophone version of competency-based teaching- or pedagogy of integration. According to him, CBA came into being because of two needs. First, the corporate world wanted a workforce having adequate training; and second, there was a need for pedagogical concepts centred on the individual result, instead of abstract knowledge (Hirtt.N, 2009). Cameroon adopted and implemented the French school of thought of pedagogy of intergration since 2018 in basic education level.

All efforts invested in teaching are futile without ascertaining that learning has taken place. The only proof that learning has taken place is an assessment result or outcome. According to Paris et al. (1991), in assessment, the teacher is kept in the centre for the assessment of all the learners’ activities arranged in the classroom. Asuru and Ogidi(2014) note that assessment devoid of the cognitive, affective and psychomotor domains is not complete. Competency-based assessment is one viable answer which encompasses knowledge, skills, and attitudes during learners’ assessment. It is one of the reasons that the Cameroon basic education 2018 new curricula requested teachers to assess learners’ competences in terms of knowledge, skills and attitude through contextualized real-life situations or complex situation problems related to monthly integrated learning themes (ILT). One of the important aspects of assessment is the availability

of valid and reliable tests set by teachers in schools. There is a need to construct these tests following established procedures and practices. This means teachers must have a sound professional and attitudinal knowledge and skills in assessment in general, and competency based assessment, in particular. According to Álvarez and Villardón (2006), competence-based assessment must be understood as the set of activities that are part of a systematic process of gathering information, which must then be analysed and interpreted, in order to issue judgments on the actions carried out by the subject, the community, or the evaluated institution. In addition, Competency-based assessment affords opportunities for teachers to naturally involve learners in the cycle of continuous improvement, bringing learners back to analyse and discuss their work, track progress over time, and set new goals for themselves as learners and thinkers that they can measure with future CBAs. The judging of evidence of competences to be developed is through a variety of assessment instruments and methods, which are: observation checklists, learner's self-assessment, daily practical assignments, samples of learner's work, learner's willingness to participate and contribute in projects/conferencing, oral and written quizzes, portfolios, willingness to be involved in class and school activities, integration activities, real-life situations, either simple or complex problem situations. In fact, in competency-based assessments, opportunities are given for learners to apply the skills and methods they have learned in their lessons to real world problems and situations to determine if they can synthesize, apply, and evaluate their learning in a purposeful way. As we can see, the focus is on skills rather than content, and the reason is not far-fetched. Content is readily accessible at the tip of a finger these days, but skills take time to develop, nurture, and finesse. However, Fab&Ezechukwu(2015) emphasize that most teacher-made tests are perceived to be either skew to testing lower cognitive levels to the negligence of the manipulative skills, attitudes, and values and of course, critical thinking which the student must have acquired during the period of learning. Nworgu(1992) confirms that, many teachers are not quite knowledgeable in the use of assessment tools which results in the faulty construction of items that do not reflect adequately the three domains of learning- cognitive, affective and psychomotor. In remedy to the situation, the teacher must be vast and knowledgeable to a variety of skills adopted by the teacher to make the learner achieve the goals of education. Ultimately, to ensure that the teacher is on track towards, or meeting his/her goals, it is the strength of the building capacity he or she possesses in assessing learners properly that matters. If a teacher is not knowledgeable about assessment, he or she will probably not use assessment in the proper way.

Recognizing the impact assessment has on teaching and learning, the American Federation of Teachers (AFT), National Council on Measurement in Education (NCME), National Educational Association (NEA) (1990) , Stiggins R (1995); Mertler CA (2003) and Popham WJ (2009) investigate the first version of the standards for teacher's competence in educational assessment of students' assessment skills. The particular skills teachers were supposed to have according to these standards were (i) choosing and developing assessment methods, (ii) using assessment results for decision making and grading, (iii) communicating assessment results, and (iv) recognizing unethical assessment practices. To be more explicit, teachers are supposed to: 1. clearly define the competencies, 2. provide an explicit link between the skills measured by the assessments and those competencies, 3. demonstrate that student behaviors or thought processes during testing reflect the competencies, 4. relate performance on competency assessments with other measures of the same competencies, and 5. document the empirical relationship between assessment scores and future outcomes (such as success in the workplace or attainment of a more advanced competency). These standards were clearly centred on teachers' assessment competence, i.e. assessment skills which address the teacher, but made no mention at all of their actual assessment activities, which immediately imply that pupils are involved, in the sense of an interaction between teacher and pupils, that support the learning

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process and pupils' success. It is on this rationale that the researcher is interested in assessing basic education teachers' skills in designing assessment criteria, teachers' mastery of evidence based on competency continuous assessment forms and teachers' strategies for communicating progress that supports the learning process and pupils' success.

THEORETICAL FRAMEWORK

Social constructivist theory of Lev Vygotsky (1896-1934)

According to Salema (2014), Vygotsky (1896-1934) is the main proponent of social constructivist theory. Meanwhile, Silvanos Chirume (2016 p.33) emphasises that, social constructivist theory of Lev Vygotsky believed that, learning could not be separated from social context. He viewed school as a perfect place to begin nurturing social interaction and learning through modelling appropriate social and academic skills. According to him, learning and development is a social collaborative activity and students construct knowledge through social interactions with others. In teaching, the teacher serves as a mediator between the student and the learning goal, providing scaffolding (i.e., learning support) to aid attainment of the goal (Black & Wiliam, 2009; Walqui & van Lier, 2010). Vygotsky (1978) emphasises the importance of the conceptual scaffolding as the gradual internalisation of knowledge, obtained by social interaction between a novice and a more competent peer or adult, who provides a model. According to him, students can master concepts which they cannot understand on their own, if they get help from adults or students who are more advanced, which he called, the Zone of Proximal Development (ZPD). Vygotsky's model implies that teachers should create more opportunities for students to learn with the teacher, peers in co-constructing knowledge. According to him, the content of knowledge's resources is influenced by the culture, which includes language, beliefs and skills. He equally notes the significant role of dialogue in learning, the place of peers in instructional practices of various learning tasks and the interactive structure of all learning tasks. In the same perspective, Henson & Eller (1999) on their part, equally support that the home environment, peer relationships, the food children eat, the clothes they wear, and the mastery of language, are factors that influence the complex procedures and adaptation among children.

Current approaches to classroom assessment have shifted from a view of assessment as a series of events that objectively measure the acquisition of knowledge, toward a view of assessment as a social practice that provides continual insights and information to support student learning and influence teacher practice. Since Competency-Based Assessment (CBA) is participatory in nature; social constructivist theory provides a framework on how active participation should be established. The theory describes the role of teachers and learners in a constructivist learning and hence, in constructivist assessment. Thus, the theory guides the evaluator in studying important aspects, such as: teachers' level of knowledge in implementing CBA and the application of authentic assessment tasks which reflect the demands of the Competency-Based Curriculum (CBC). Thus, the teacher should be well acquainted with knowledge and skills of designing and implementing competence-based assessment tasks, which are authentic, such that, it measures the intended learning outcomes by actively engaging pupils.

Research questions

The following research questions are used:

- I. What is the median rating score of basic education teachers' skills in designing assessment criteria?
- II. What are the median rating scores of basic education teachers' mastery of evidence-based competency continuous assessment forms?
- III. What are the median basic education teachers' strategies for communicating progress that support the learning process and pupils' success?

Methodology

The study adopted a survey research design that describes the existing problem of basic education teacher’s competency in continuous assessment features for Saa subdivision of Cameroon. Saa subdivision is comprised of 402 target teachers’ population in basic education teaching in 49 nursery and 63 primary schools.

A proportional stratified random technique was used for the selection of an accessible population of 79 teachers among the 63 Primary schools. The population was characterized by both males and females with various years of teaching experience and qualification ranging from P-T-A trained teachers; contract teachers(IC) ; Grade I, GCE, O level or BEPC , Probatoire and A level or BAC, university degree holders, etc...

Table I. Showing the sample of Primary school teachers as used in this study.

Gender	Grad II	Grad I	FSLC	GCEO/L	GCE A/L	Bachelor	Masters	none	Total
Male		30		18	12	/	/		30
Female		49		29	20	/	/		49
Total		79		47	32	/	/		79

A teacher’s questionnaire named Assessment of Basic Education Teachers’ Competency in continuous assessment features in Saa subdivision of Cameroon (ABETC) was developed by the researcher and was used to collect data from them. Cronbach’s Alpha of 0. 84 was established as the coefficient of reliability of the instrument .The instrument consisted of two Parts: A and B.

Part A: Teacher’s Demographic Information (TDI)

Results obtained were analysed using descriptive statistics, percentages and bar charts.

PART B of the questionnaire, has three sub-sections that asked questions on the variables of the study.

Section A covers items 1 to 7 to assess basic education **teachers’** skills in designing assessment criteria.

Section B is made up of 8 items which assess basic education teachers’ mastery of evidence-based competency continuous assessment forms.

Section C is made up of 10 basic education teachers’ strategies for communicating progress that support the learning process and pupils’ success. The response format of each section was on 5 point Likert scale and weights, as thus: Highly Competent (HC= 5 points), Competent (C= 4 points); Moderately competent (M C= 3points); Low Competent (LC= 2 POINTS) and Not Competent (NC= 1point). The maximum score for all the items is 125 marks, while Minimum score is 25 marks. Total score of each item is taken as the index of assessment of basic education teacher’s competency in continuous assessment features in Saa subdivision of Cameroon. The medianscore of Part B (M=3) and above for each scored items indicates competence with the statement on the items, thus acceptance. While the medianscore less than 3 indicates ‘Not Competent’ of the statement on each item. The researcher could not afford any assistant due to limited means.

Results

Research question 1: What are the median rating score of basic education teachers’ skills in designing assessment criteria?

Table 1: Median rating of teachers’ skills in designing assessment criteria.

S/N°	Competences	HC	C	MC	LC	NC	Mean	Decision
1	Ability to determine minimal criteria	22	22	27	8	0	3.73	Competent
2	Ability to determine performance outcome criteria	20	24	20	10	5	3.25	Competent

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3	Ability to operationalise both qualitative and quantitative indicators from the main criteria	12	15	21	15	16	2.89	Not Competent
4	Ability to design criteria in cognitive or knowledge domain	18	26	15	12	8	3.43	Competent
5	Ability to design criteria in psychomotor or skill domain	11	7	21	22	28	2.76	Not Competent
6	Ability to design criteria in affective or attitude domain	12	23	17	16	11	3.11	Competent
7	Ability to assess pupils with a recommended marking guidelines provided by the ministry	20	12	23	17	7	3.26	Competent
Grand mean							3.20	Competent

Table 1 reveals Median rating scores of teachers' skills in designing assessment criteria. Item 1, Median= 3.73; Item 2, Median= 3.25; Item 3, Median= 2.89; Item 4, Median= 3.43; Item 5, Median= 2.76; Item 6, Median= 3.11; Item 7, Median= 3.26 while the grand median is 3.20 meaning that the teachers are competent

Research question 2: What are the median rating scores of basic education teachers' mastery of evidence based on Mathematics competency continuous assessment forms?

Table 2: Median rating scores of teachers' mastery of evidence based on Mathematics competency continuous assessment forms.

S/N°	Competences	HC	C	MC	LC	NC	Mean	Decision
1	Ability to monitor a Mathematics project with the integrated learning theme of a month	10	18	36	5	10	2.91	Not competent
2	Ability to use computer-assisted test in class with pupils	4	10	12	37	16	2.23	Not competent
3	Ability to design a contextualized real-life situation in Mathematics competence	24	14	16	17	8	3.37	Competent
4	Ability to allow pupils do practical assignment	14	11	6	25	23	2.59	Not competent
5	Ability to organize oral work tests in class	31	14	7	15	2	3.34	Competent

6	Ability to write complex integration situations in Mathematics competence of different tasks	21	14	5	22	2	2.81	Not competent
7	Ability to observe pupils attitudes in Mathematics competence from a checklist	11	13	9	22	24	2.56	Not competent
8	Ability to organize pupils in self-assessment	13	17	12	24	13	2.91	Not competent
Grand mean							2.84	Not competent

Table 2 reveals Median rating scores of teachers’ mastery of evidence based on Mathematics competency continuous assessment forms. Item 3 median rating score = 3.37 item 5 Median= 3.34. Item 1, median rating= 2.91; item 2, median rating= 2.23; item 4, median rating= 2.59; item 6, median rating= 2.81; item 7, median rating= 2.56 and item 8, median rating = 2.91. The grand mean is **2.84** showing that teachers are not competent in continuous assessment

Research question 3: What are the medianbasic education teachers’ strategies for communicating progress that support the learning process and pupils’ success?

Table 3 : Median of teachers’ strategies for communicating progress that support the learning process and pupils’ success

S/N°	Competences	HC	C	MC	LC	NC	Mean	Decision
1	Ability to diagnose pupils’ difficulties during integration activities	23	23	17	6	10	3.54	Competent
2	Ability to involve pupils in needs of support for remedial works	15	23	20	16	5	3.34	Competent
3	Ability to convoke parents of pupils who perform poor after each continuous assessment	21	12	16	17	13	3.14	Competent
4	Ability to clearly inform pupils what they need to learn and later on be evaluated	31	22	12	12	2	3.86	Competent
5	Ability to inform pupils’ continuous assessment calendar	45	12	14	7	1	4.17	Competent
6	Ability to record pupils’ progress in class broadsheet	51	21	4	2	1	4.50	Competent
7	Ability to record pupils’ progress in report cards	50	22	4	2	1	4.49	Competent

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8	Ability to record pupils' progress scores in a software such as a computer, a telephone, flash or USB keys etc..	10	8	10	32	19	2.47	Not Competent
9	Ability to inform learners' progress to their parents and guardians through e-mail	11	5	6	41	16	2.42	Not Competent
10	Ability to discuss good learners' work with colleagues	25	14	15	15	10	3.37	Competent
Grand mean							3.53	Competent

Table 3 reveals Median rating scores of teachers' strategies for communicating progress that support the learning process and pupils' success. For Item 8, Median= 2.47 and item 9, median= 2.42; However, item 1, Median= 3.54; item 2, Median= 3.34; item 3, Median= 3.14, item 4, Median= 3.86; item 5, Median= 4.17, item 6, Median= 4.50, item 7, Median= 4.49 and item 10, Median= 3.37. The grand mean is 3.53 showing that teachers are competent in using strategies for communicating progress.

Discussion

Research Question 1 inquired about the extent to which basic education teachers possess skills in designing assessment criteria in continuous assessment features during assessment of Mathematics attainment competence amongst primary school teachers in Saa subdivision. The findings show that basic education teachers are competent in ability to determine minimal and performance outcome criteria, to design criteria in cognitive and affective domains and to assess pupils with the official recommended marking guidelines provided by the ministry. However they are not competent in the ability to operationalise qualitative and quantitative indicators from the main criteria, as well as in the ability to design criteria in psychomotor or skill domain. This finding agrees with Okpara et al(2020), which revealed that teachers are competent only in evaluating students' handwriting on Mathematics note, while they are not competent in evaluating students in the following psychomotor areas: drawing skills in Mathematics lesson, handling of mathematical tools and verbal fluency in Mathematics lesson. It implies that teachers do not possess the competency to objectively evaluate students' psychomotor areas of Mathematics lesson. This study also corroborates with Aduloju, M.O &Agi,C.I (2015 p.81) as they quoted Akem(2005),Adikwu(2008), Nwogu in Adulodjo(2010), Udo(2014) and Denga(2000) that stressed the need for teachers to acquire adequate knowledge of test development and continuous assessment practices to enable them make necessary improvement in developing instrument for evaluation.

Research Question 2 inquired about the extent to which basic education teachers possess mastery of evidence in competency continuous assessment forms during assessment of Mathematics attainment competence amongst class six pupils in Saa subdivision. The result of the study in table 2 revealed a low medianscore in teachers' mastery of evidence based in competency continuous assessment forms. The findings show that basic education teachers are only competent in the ability to design a contextualised real-life situation in Mathematics competence and to organise oral tests in class. While they are not competent in the ability to monitor Mathematics project related to the integrated learning theme of a month, to use computer-assisted test with their pupils, to allow their pupils do practical assignments, to design complex integration situations in Mathematics competence of different tasks, to observe pupils attitudes in Mathematics competence from a checklist and to organise pupils' self-assessment.

In conclusion, most teachers are not competent in the ability to implement the mastery of evidence in competency continuous assessment forms amongst class six pupils in Saa subdivision for the attainment of their Mathematics competence. In line with Kwok(2006), teacher's knowledge and understanding of assessment remain the determining factor in integration of assessment in the classroom. The result is also in consonance with Nenty and Lusweti(2014) who are of the opinion that teachers should be assessment-literate i.e having good and practical knowledge of testing procedure for valid result.

Research Question 3 inquired about the extent to which basic education teachers possess strategies for communicating progress that support the learning process and pupils' success. The findings indicate that teachers are not competent in the ability of recording pupils' progress in a software, such as a computer, a telephone, flash or USB keys etc.; in addition, even to inform learners' progress to their parents and guardians using e-mail addresses. Parents will be better able to monitor their child's progress if they receive clear information communicated in a variety of ways. However, the result is in contrast to Nisar, Munir and Shad(2011), who examined the use and effects of ICT skills in the education sector of Pakistan. The study instead revealed that, ICT helped the students to improve on their skills and also improve their learning skills. The result showed that the availability and ICT usage improved the knowledge and learning skills of learners. This implies that ICT skills can be learnt through a more knowledgeable other (MKO). A more knowledgeable other (MKO) is anyone who has a better understanding or a higher ability than the learner, concerning particular activities or process. The MKO could be a teacher, an older person or adult, peers or even computers. Edumadze and Owusu(2013) opine that the knowledge and ICT skills of lecturers' predicted the level of ICT integration in their teaching process.

However, teachers are competent in the ability to diagnose pupils' difficulties during integrations activities. They involve pupils in needs of support for remedial works and convoke parents to school after each continuous assessment. They clearly inform pupils what they need to learn and later on what to be evaluated; they inform pupils' continuous assessment calendar; record pupils' progress through class broadsheets and report cards, as well as discuss good learners' work with colleagues. The result aligns with Québec, Ministry Education's Policy on the Evaluation of Learning (Québec, 2003) and Adapting Our Schools to the Needs of All Students: Policy on Special Education (Québec, 1999). The best support of learning, students' progress should be communicated to parents and students in a way that allows for appropriate pedagogical intervention.

Conclusion and Recommendations

Based on the findings of the study, the researcher concludes that teachers are competent in the ability of filling broadsheets, report cards and effective feedback, integration activities, in determining minima and performance outcome criteria, in designing criteria in cognitive and affective domains and in assessing pupils with the official recommended marking guidelines provided by the ministry. However, a good number of them were not competent in ability to use of computer-assisted test, complex integration situations, checklists and pupils' self-assessment, to operationalise qualitative and quantitative indicators from the main criteria, in designing criteria in psychomotor, in recording pupils' progress in a software, such as a computer, a telephone, flash etc, in informing learners' progress to their parents and guardians through e-mail. Following such lapses, school administrators are recommended to organise further training workshops and conferences, seminars, symposia regularly to update teachers already on the field with the building capacity of Competency based Evaluation system. Government should highly equip schools with computer centres with internet connection that will serve teachers as e- learning libraries. Each school should recruit computer teachers that will train teachers how to use Information Communication Tools (ICT) in support of pupils' learning and assessment. New teachers training college curricula should be drafted

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that will effectively respond to the changing needs of new methods of competency continuous assessment features' skills.

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Development of Rubric for Empirical Rating of Postgraduate Students Research Skills

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Abstract

The study developed and validated a rubric for empirical rating of post graduate students' research skills. Instrumentation research design was adopted for the study. The study was carried out among the five units from the Department of Science Education University of Nigeria, Nsukka. One research question and one hypothesis guided the study. Purposive sampling technique was adopted. A total of 177 students' project reports were used to collect the data using "Empirical Research Skill Rating Rubric (ERSRR)". The instrument was subjected to a preliminary (face) and empirical validation. The instrument was trial tested on 20 Post graduate students of Nnamdi Azikiwe University, Awka. Project reports of twenty students who have done their seminars and waiting for Oral (external) examination was graded by four different raters (lecturers). The four raters (lecturers) graded the projects to empirically rate the research skills deployed by each student. A reliability coefficient of 0.78 and 0.80 was obtained using Cronbach alpha and inter rater's variability, indicating that the instrument is reliable. The data collected was analyzed using mean and standard deviation while the hypothesis was tested using analysis of variance (ANOVA) at 0.05 level of significance. The result shows that post graduate research skills were high, and there is no significant difference in the mean scores of students in different areas. The study recommended that higher institutions of learning should adopt the developed instrument in assessing their students since it has been confirmed reliable and when used across different subject areas, the results did not significantly differ.

Keywords: Validation, Rubric, Research and Research Skills

Introduction

Research is the hallmark of University education. Students at this level are usually provided with the opportunity to engage in independent writing and oral presentations. The early knowledge of the basics in research is of immense benefit to students if they are to explore educational ideas that make impact, because it adds to the existing pool of knowledge. Research is a systematic exploration into educational materials and like-resources, with the aim of confirming facts and reaching a decisive conclusion (Jagoda & Biljana, 2013). Research deals with the development of new ideas or knowledge from the existing literature, principles and ideas. It has to do with a level of creativity of the researcher because a well-conducted and systematic research gives rise to new concepts, ideas and methodology. According to Tavares and Eva (2013) research is the creation of new knowledge and principles through the application of existing knowledge in a systematic way.

Research is inventive and procedural in nature. According to Organization for Economic Co-operation and Development (OECD (2015)) it is a creative and systematic adventure carried out in order to increase the pool of knowledge; it involves the collection of relevant information, reviewing, organizing and analyzing such information with the singular aim of enhancing understand 1 a topic or phenomenon. Research employs

scientific methods to explore specific problems, with the aim of providing necessary information to ameliorate such problems. Research systematically involves a number of processes in an attempt to proffer practical solutions to the problem under study. A number of abilities are deployed to critically examine the concept or topic under investigation; these abilities employed in investigation processes are referred to as research skills.

Research skills are vital ingredients of educational investigation process. They are skills employed by individual researchers to find head-way in each of the processes or steps involved in research. Research skills include all the abilities employed in starting and completing a research study (Kauts & Kaur, 2020). Research skills enable researchers to know where and how to find relevant information and create outline for writing and reporting findings. Communicating research findings in writings of reports follows a systematic procedure as well as shows the level of skills students have acquired and deployed in the research processes. Report writing shows an empirical manifestation of students' research skills. In other words, a research report can be used to assess the amount and quality of research skills possessed by the researcher.

It has become a challenge in using students' research report to assess their research skills. This is due to the subjective nature of the grading system employed by those who assess these students. In using a subjective grading system, the scores obtained from such assessment is usually prone to bias and may even be faulty, since the scoring of such report is solely dependent on the assessor's view and opinion about research. In subjective assessment of scores, students are arbitrarily assigned scores, and this has serious implication as the assessor's judgment could be done by guessing. As such, grading is not uniform across all levels of students. Grading requires a lot of time and critical thinking. Subjective grading of students is usually influenced by the relationship of such student with the assessor. Many a time, there is no explanation to how the students got the grades they were given, hence, the grades do not accurately reflect what a student has learnt or is learning, especially for the universities in the South East that have similar grading rubric that do not specifically outline the ingredients that should constitute the grading system for a particular area of research expertise. Thus, the graders arbitrarily assign grades based on how they feel it should be and not how it actually is with respect to a given standard. To ameliorate such situation, it is therefore necessary to develop a rubric that will guide the assessment of students. This study investigated the development and validation of a rubric for empirical rating of post graduate students' research skills.

A rubric is a simple way to set up grading criteria for assessments. A rubric is a scoring tool that outlines the criteria for a piece of work or that which counts in a work (Andrade, 2008). A good rubric describes levels of quality for each criterion; and the level of performance can be written as different ratings e.g. excellent, good, fair, and poor; or in numeric values e.g. 4, 3, 2 and 1. According to Brookhart (2013) a rubric is a coherent set of criteria for students' work that include descriptions of level of performance quality on the criteria. The major purpose of a rubric is to assess performances. These performances can either be when the activity is on-going or using the product (outcome) of such activity to make evaluation. A well-developed rubric helps to reduce the guessing in evaluation and helps the students to understand and learn from their mistake (Burghart & Panettieri, 2009). Rubrics also offer productive opportunities for enriching the student-teacher relationship and improving instruction (Gallo, 2004).

To develop a rubric, it is necessary to establish learning goals and assessment criteria distinguishing between project or skill assessment, and also introduce the rubric to the students and the assessors, so that they can know how to use them to improve their skills (Gallo, 2004). This is the formative property of a rubric. Wolf and Stevens (2007) identified specific steps in creating a rubric; these steps include; identifying performance criteria,

setting performance level, and creating performance description. Zahid and Khanam (2019) outlined four major components of a rubric: task description, scale, dimensions and description of the dimensions. The task description relates the actual assignment given to the students; the scale deals with the grading criteria e.g. excellent, competent (or numeric values of 4, 3, 2, and 1); dimensions of assignment include; organization, clarity, argument, and grammar. Way and Rairigh (2006) added that applying the rubric and reviewing its effectiveness to know if it is necessary to make modifications. This process of determining the effectiveness and dependability is known as validation.

Allen and Knight (2009) collaboratively developed and validated a rubric that integrates baseline data from academics and professionals that insured precision in grading papers in multiple sections of a course. Cyr, Smith, Broyles, Holt (2014) also developed, evaluated and validated a scoring rubric for written case reports. Stellmack, Konheim-Kalkstein, Manor, Massey and Schmitz (2009) described the empirical evaluation of the reliability and validity of a grading rubric for grading APA-style introductions of undergraduate students; rank-order correlations between graders who used the rubric and an experienced instructor who ranked the papers separately and holistically provided evidence for the rubric's validity. Williams, Northcote, Morton, and Seddon (2017) also reported that a good rubric should be used by various teachers and have all of them arrived at similar scores (for a given assignment). Reliability also can refer to consistency over time (for example, if you are scoring your 100th essay – the rubric allows you to judge the 100th essay with the same criteria that you judged the 1st essay).

Ugwu (2014) developed and validated an instrument for assessing secondary school students' practical chemistry skills acquisition in qualitative analysis. Cronbach alpha reliability technique and Kendall's coefficient of concordance were used to establish the reliability, and the instrument was found to be reliable. The present study developed and validated a rubric for empirical validation of post graduate students research skills. According to Stevens and Levi (2005), grading rubrics can be used to assess a range of activities in any subject area. Arter and McTighe (2001) also affirm that rubrics allow for consistency in grading for those who team-teach the same course, assigned to the task of grading, and serve as good documentation for accreditation purposes. Huba and Freed (2003) reported that rubrics offer the possibility of objective, consistent evaluation minimizing difference in grades even when multiple raters are involved in evaluating a student's work. Jonsson and Svingby (2004) asserted that 'reliable scoring of performance assessments can be enhanced by the use of rubrics, especially if they are analytic, topic-specific, and complemented with examples and/or rater training. The present study developed and validated rubric for empirical rating of research skills of post graduate students.

Research Question

The study was guided by the following research question:

1. What are the mean scores of Post graduate students' research writing skills with respect to their subject areas?

Hypothesis

The following hypothesis was formulated for the study:

1. There is no significant difference in the mean scores of Post graduate students' research writing skills with respect to their subject areas?

Method

The study adopted instrumentation research design. Instrumentation research design is a type of design that deals with the process of constructing research instrument that could be used appropriately in gathering data on a study (Bitonio, 2014). This design is suitable for the study because the study deals with the development and validation of rubric for empirical rating of post graduate students’ research skills. Purposive sampling technique was employed and Science Education Department, University of Nigeria, Nsukka was selected. Purposive sampling was used because the department is multi-disciplinary; hence, it is made up of different subject areas namely; Biology Education, Chemistry Education, Integrated Science Education, Measurement and Evaluation and Physics Education; therefore constituting a good sample. All the completed projects that have been assessed at the seminar stage and ready for Oral (External) Examination were used for the study. A total of 177 students’ project reports were used to collect the data. A total of 72 projects from Biology Education, 56 from Chemistry Education, 18 from Integrated Science Education, 23 from Measurement and Evaluation and 8 from Physics Education. The data was collected using the developed instrument (Empirical Research Skill Rating Rubric (ERSRR)). The ERSRR is made up of sections A, B, C, D, E and F. Section A contains comprehensive information about preliminary pages of thesis writing, sections B, C, D, E and F contain comprehensive information about chapter one, two, three, four, and five respectively. The instrument (ERSRR) was designed in five point-Likert scale of 1, 2, 3, 4, and 5 showing the degree to which post graduate students actually possess these research skills.

The instrument was first subjected to a preliminary validation (face validation) and later to empirical validation. For the face validation, three experts from Measurement and Evaluation Unit, Department of Science Education, University of Nigeria, Nsukka validated the instrument. For the empirical validation, the instrument was trial tested on 20 Post graduate students of Nnamdi Azikiwe University, Awka. Project reports of twenty students who have done their seminar and waiting for Oral (external) examination were graded by four different raters (lecturers) using the developed instrument (ERSRR). The four raters (lecturers) graded the projects to empirically rate the research skills deployed by each student. Cronbach Alpha reliability technique and Kendal coefficient of concordance were used to determine the internal consistency and degree of agreements by the raters respectively. A reliability coefficient of 0.78 was obtained using Cronbach alpha while a coefficient of 0.80 was obtained for the degree of agreement of the raters using Kendall’s coefficient of concordance, indicating that the instrument is reliable. The data collected from the 177 post graduate students from Department of Science Education, University of Nigeria, Nsukka was analyzed using mean and standard deviation while the hypothesis was tested using analysis of variance (ANOVA) at 0.05 level of significance.

Results

Research Question 1: What are the mean scores of Post graduate students’ research writing skills with respect to their subject areas?

Table 1: Mean and standard deviation of Postgraduate students project reports by subject area

Subject Area	N	Mean	Std. Deviation	Std. Error
Biology Education	72	63.53	10.91	1.29
Chemistry Education	56	64.55	10.71	1.43
Integrated Science Education	18	62.28	11.66	2.75

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Measurement and Evaluation	23	64.61	11.59	2.42
Physics Education	8	60.25	11.22	3.61
Total	177	63.72	10.91	0.82

Table 1 shows the mean scores of postgraduate students' project reports with respect to their subject areas. Biology education students have a mean score of 63.53 with a standard deviation of 10.91, Chemistry Education, Integrated science education, measurement and evaluation and Physics education have a mean scores of 64.55, 62.28, 64.61 and 60.25 respectively with standard deviation of 10.71, 11.66, 11.59 and 11.22 respectively too. This is an indication that the postgraduate students have good research skills with respect to their areas of specialization, since the mean scores were more than 50%.

Hypothesis 1: There is no significant difference in the mean scores of Postgraduate students' research writing skills with respect to their subject areas?

Table 2: ANOVA summary table for the difference in mean scores of Post Graduate students' project reports

Groups	Sum of Squares	df	Men Square	F	Sig.
Between Groups	193.503	4	48.378	0.401	0.808
Within Groups	20766.373	172	120		
Total	20959.876	176			

Table 2 shows that the associated probability value for the calculated F (0.401) for the differences in the mean responses of Post graduate students with respect to their study areas with an associated probability of 0.808. Thus, Post graduate students' research skills, with respect to their subject area is not significant since associated probability value of 0.80 is greater than 0.05 level of significance.

Discussion of Findings

The findings of the study show that Postgraduate students of Science Education (Biology Education, Chemistry Education, Integrated Science Education, Measurement and Evaluation and Physics Education) all have a high level of research skills. This could be attributed to the method adopted by the department in providing training for the students with respect to the area of the study of each student. The mean rating of each subject area also shows that there is no significant difference. The implication of this is that the Empirical Research Skill Rating Rubric (ERSRR) for Post graduate Students would provide reliable result when used to assess students across the subject areas. This is in line with the findings of Williams, Northcote, Morton, & Seddon (2017) that a good rubric should be able to be used by various teachers and have all of them arrive at similar scores (for a given assignment). Reliability also can refer to time (for example, if you are scoring your 100th essay – the rubric allows you to judge the 100th essay with the same criteria that you judge the 1st essay).

The result is also in agreement with the findings of Stevens and Levi (2005) that grading rubrics can be used to assess a range of activities in any subject area. The ERSRR is in agreement with the findings of Arter and McTighe (2001) that rubrics allow for consistency in grading for those who team-teach the same course, assigned to the task of

grading, and serve as good documentation for accreditation purposes. The result agrees with the findings of Huba and Freed (2003) who reported that rubrics offer the possibility of objective, consistent evaluation, minimizing difference in grades even when multiple raters are involved in evaluating a student's work. The findings is also in line with the findings of Jonsson and Svingby (2004) that conclude that 'reliable scoring of performance assessments can be enhanced by the use of rubrics, especially if they are analytic, topic-specific, and complemented with exemplars and/or rater training.

Conclusion and Recommendations

Based on the findings of the study, it was concluded that postgraduate students have good research skills and always deploy these skills in their project report writing. It is also indicative that students from the various units in the departments must have undergone collaborative study, as well as peer tutoring in order to be conversant with the various research skills learnt; and are also committed to deploying the research skills for greater academic advancement. Based on the findings of the study, the study recommends that higher institutions of learning should adopt the developed instrument in assessing their students, since it has been confirmed reliable, and when used across different subject areas, the results did not significantly differ.

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