Diagnostic Assessment: A Tool for Quality Control in Education

Abstract

The paper examines the need to integrate diagnostic assessment (DA) in teaching and learning process to serve as quality control measures in the education system. It defines quality control as a system for setting standards in a process and taking appropriate actions to deal with deviations outside permitted tolerance. The need for the use of diagnostic assessment for quality control was discussed, in terms of its appropriateness in assessing students’ learning difficulties for remediation measures. The steps in designing and conducting diagnostic assessment for quality control in education identified are; specify learning goals and objectives, plan classroom and assessment, deliver instruction to identify learners’ gaps among others. While the models recommended were Item Response Theory for quiz/test, Empowerment evaluation model for conference/interview and self-assessment types of diagnostic assessment, and CIPP for holistic diagnostic assessment of the education system. Challenges of implementing diagnostic assessment identified include large class size, non-inclusion of DA in the curriculum; lack of commitment on the part of teachers as well as lack of motivation of teachers by their employers could hinder the implementation of DA in schools. Recommendations were made. Finally, the paper concludes that integrating diagnostic assessment in the teaching and learning process would improve students’ comprehension level, reduces their errors and provide timely remediation measures before they are allowed to participate in standardized examinations.

Keywords: Quality Control, Diagnostic Assessment

Introduction

Human resources (knowledge, skills and abilities) are indispensable in the onerous task of national development. These attributes are achieved through quality education. According to Taiwo (2012), every society needs adequate human resources to improve her social organization, preserve the culture, enhance economic development, and reform the political structures. Supporting this view, Usoro (2010) posits that the rapid development of any nation depends largely on the caliber of her youths, since every sector of a nation’s economy is expected to be managed by competent personnel, which are mostly young people. In Nigeria, education is geared towards the acquisition of appropriate skills and the development of mental, physical and social abilities and competencies as equipment for the individual to
live in and contribute to the development of the society (FRN, 2004). These make education really the bedrock of any civilization, an instrument par excellence for effecting national development and a potent tool for achieving national objectives.

Sadly, today education in Nigeria is widely criticized of poor quality. The poor performances recorded each year in the standardized examinations at the secondary school level and increase in the number of unemployable Nigerian graduates is a reflection of the falling standard of education in the country. Collaborating this view, Dadughun (2001), observed that there has been a general expression of dissatisfaction with the quality of graduates being turned out in Nigerian tertiary institutions. Similarly, Effiong and Abola, (2014); Oranu, (2015), and Ogunsola, (2015) affirmed that Nigerian graduates lack the requisite skills in their chosen fields. In the same vein, Dayo (2015) admits that Nigeria as a country has an oversupply of tertiary graduates that fail to possess the 21st century skills and competencies employers often need. Therefore, there is the need to integrate a quality control mechanism in the teaching and learning process in ensuring that quality school leavers and graduates are produced using diagnostic assessment (DA). This will help in identifying students’ learning difficulties for teachers to take remediation measures before they are engaged in any standardized test or certification. According to the words of a quality expert Deming (as cited in Nevkar & Hime, 2005) that quality is not just inspected in a product, but built in it.

This paper therefore examines the concept of quality control and diagnostic assessment. It also discusses the use of DA for quality control in education, provides a framework for carrying out diagnostic assessment and suggests models for conducting diagnostic assessment. Finally, it identifies challenges and made suggestions on the way forward.

**Concept of Quality Control**

Quality is defined as the attributes that determine whether something is good or bad (Longman Dictionary of Contemporary English, 2007). It is about the standard of something when compared with other related things. Amen, Odusami and Ige (2002) pointed out that quality is the concept used to sum up those characteristics, which together make a product acceptable to the users. They explained further that, quality affects all that we do and it covers all those characteristics of an item or services, which ensure that it meets the required function. In the manufacturing field, quality is defined as conformance or compliance to specifications (Nevkar & Hime (2005). Quality control on the other hand is defined as basically, a system for setting standards and taking appropriate action to deal with deviations outside
permitted tolerance Cole cited in (Taiwo 2012). Quality control is a management system product based approach that is concerned with the operational activities and techniques that help to find defects in products, which wastages would have occurred for rectification. Quality control is also a process by which entities review the quality of all factors involved in production chain and this makes use of testing to measure the achievement of specified standards (philosophe.com/testing/9c/). The objectives of quality control process include: to make sure that the products are defect free and acceptable as per the quality requirement (Fahad, n.d.). The second objective of quality control is to validate the products using quality assurance standards(s). Fahad explained further that if the products have defects they can be quickly corrected using the laid down quality standard(s) and it helps to eliminate waste in a system.

From the aforementioned, the characteristics of the concept quality control are synonymous with educational diagnostic assessment, which identifies students’ learning difficulties, errors and misconceptions about what they have already learnt for remediation measures since students can also be made to unlearn. However, quality control practices in Nigeria education is based essentially on school inspection, monitoring and control. While such measures are appropriate for obtaining data on policy implementation, for strategic planning and to aid public accountability, these are of little value when it comes to managing classroom and learning process in achieving the stated objectives, West-Burnham (as cited in Taiwo, 2012). This is where the use of diagnostic assessment for quality control becomes imperative in Nigeria education system.

**Concept of Diagnostic Assessment**

According to Ugodulunwa (2008), assessment is the process of measuring behaviour of an individual and using the result in taking relevant decisions about the individual, curriculum and instruction or a programme. It is also referred to as a process of gathering and documenting knowledge, skills, attitudes and beliefs upon which judgment or evaluation can be made. Fagbemi (2001), viewed assessment as a method of using variety of tests designs for diagnosis, monitoring or evaluation. An excerpt from the teacher training manual NTI (2012) revealed that educational assessment could be conveniently grouped in four categories: Formative, Summative, Placement and Diagnostic and assessment could be school-based or external. Therefore, diagnostic assessment involves the gathering and careful evaluation of detailed data to diagnose strengths and areas of need in all students in a given learning area (Department of education, 2013). The data assist teachers to plan for appropriate pedagogy and targeted learning to more effectively scaffolding the learning needs of their students. Ugodulunwa, also affirmed that DAs are used for identifying and remedying learning difficulties, errors and misconceptions which formative
assessment could not correct. Diagnostic Assessment is used for learning when taking action to adjust teaching, and it plays a significant role in improving learning outcomes for all students. It assesses what the learner already knows, the nature of difficulties that he/she has, which if undiagnosed might limit their engagement in new learning. In the words of Betts, Hahn and Zau (2011) defined DA as a process that involves making judgments as to how a student is performing against a predetermined set of criteria. This kind of assessment must be linked to further work, which will tackle problems identified. This implies that formative and diagnostic assessment overlap.

Barr, Blachowicz, Katz, and kaufman (2013), outlined the principles of diagnosis as follows:

1. Diagnosis is a decision-making process. Teachers are constantly making decisions about individual or group of students in achieving learning objectives.
2. Diagnosis process considers the whole learner. This implies that teachers should examine multiple forms of data including past experiences, attitudes, learning styles, interest, strengths and weakness, reasons for referral, conducting interviews with parents etc.
3. Diagnostic is thorough and balance.
4. Diagnostic is a team effort: it is impossible to learn about the child from various perspectives like physically, psychologically, emotionally, socially and academically.
5. Determine the specific nature of learning difficulties: diagnosis of learning difficulties depend on the nature of the difficulty.
6. Determine the factors causing learning difficulties.
7. Diagnosis and remediation go hand in hand. The effectiveness of any teaching and learning process depends on teacher understanding the learners’ level of mastery of the subject area and is achieved through DA.

The different forms of diagnostic assessment identified by Patti (2012) are:

1. Journal: A response journal is a student’s personal record containing written, reflective, view etc
2. Student Self-Assessments: is a process by which the student gathers information about himself and reflects on his or her own learning.
3. Quiz/test
4. Placement Graphic organizer
5. Conference/interview
6. Poster
Importance of Using Diagnostic Assessment for Quality Control in Education

Diagnostic assessment is important in teaching and learning process as it provides quality control measures by assessing learners’ strength and weaknesses for remediation. According to Gani (2015), DA improves teaching and learning in education as it identifies the strength and weaknesses of students and also as an indicator of the effectiveness or ineffectiveness of the education system. The outcome of a well-designed diagnostic assessment with a proper remediation will go a long way in reducing failure rate especially in the standardized examinations and improves performance in the area of skills acquisition.

Studies on diagnostic assessment have indicated positive results. Imo (2002), conducted a diagnostic assessment on students’ understanding of simple harmonic motion concept in physics. The findings revealed lower mastery level of students’ knowledge in all aspects of simple harmonic motion. This shows that DA could provide useful information on students learning difficulties. Sewell (2004) developed and validated a diagnostic test for the purpose of providing feedback on skills and abilities of adult learners in United Kingdom. A variety of test tasks was employed including both multiple choices and open writing tasks. The research results demonstrated that the diagnostic test could provide a comprehensive diagnostic feedback on learners’ strength and weaknesses.

Jang (2005) investigated the validation process of the effects of the diagnostic cognitive reading skills assessment on teaching and learning. The empirical evidence showed that the diagnostic test was quite valid and could provide informative feedback to teachers and students. Gani (2015) carried out an
empirical study on diagnostic assessment of students’ achievement in quantitative aspect of Economics in Akwanga. The finding revealed students’ weaknesses in areas like basic tool for economics analysis, consumer theory and theory of demand supply and price determination. Obadare-Akpata (2015) constructed and validated a diagnostics instrument that measures the achievement motivation of students in Mathematics and the findings did not only reveal that students that are highly achievement motivated are higher scorers in Mathematics but also ascertain the tendency of the less achievement motivated students being involved in examination malpractices during either internal or external Mathematics examination. In the light of the above, diagnostic assessment could provide a quality control tool for providing useful feedback on areas of students’ learning difficulties for remediation.

**Framework for using Diagnostic Assessment for Quality Control**

The process of using diagnostic assessment for quality control in education demands a holistic assessment of the learners and other variables. Chatterji cited in Nancy (2012), developed the Proximal Assessment for Learner Diagnosis (PALD) Framework to help teachers diagnose and mediate students’ learning needs with the following stages;

1. Specify learning goals and objectives: the teachers should specify long and short-term learning outcomes in terms of knowledge, skills, attitudes, behaviour or tasks that students would expect to master in a unit.
2. Plan classroom instruction and assessment: teachers should develop instructional plans and teaching strategies tied to specified learning outcomes. Design developmentally; diagnostic assessment (tasks/items) tied to ordered domains and culminating tasks.
3. Deliver instruction and embed PALD cycles to identify learners gaps:
   a. Communicate learning expectations to students at the beginning of the instructional cycle;
   b. Embed self-designed assessments for diagnosis of learners needs;
   c. Probe to identify learning gaps;
   d. Conduct error analysis of students responses to identify learning gaps;
   e. Mediate, coach, re-teach and give concentrated feedback to students;
   f. Give students planned practice to facilitate learning;
   g. Encourage meta-cognition and self-reflection to facilitate learning;
   h. Use formative assessment result to revise desired learning outcomes;
   i. Use formative assessment result to improve instructional plans, teaching strategies and assessment tools;
j. Provide students with new or added instruction and continue formative cycles of instruction and assessment as new materials are introduced.

4. Administer end-of-unit assessment for summative decision-making at the end of an instructional cycle and move to a new unit of instruction.

UNESCO (2012) also developed a General Education Quality Analysis/Diagnosis Framework (GEQAF). The framework adopts a comprehensive and systemic approach to education. It acknowledges that the reality, the accountability to deliver quality and effective learning lies at all levels and in all aspects of an education system. The GEQAF contains 15 analytical tools covering all key aspects of an education system taking into account the interdependencies and linkages between the various aspects.

1. Relevance/responsiveness: here the DA should take thorough analysis and textured understanding of the development context(s) of an education and training system as an inescapable starting point for determining the adequacy of education quality and the probability of learning effectiveness. The paramount question to be addressed by this toolkit is; have we ensured relevance of our education system to reach the desired level of education quality and learning effectiveness?

2. Life-long learner: the diagnostic assessment focuses on the issue of systematic development of learning opportunities so that learning becomes an activity accompanying people along their whole lifespan. The question is; have we integrated life-long learning into our education system and provide many opportunities for learning to our citizens throughout their life?

3. Learning outcome: the diagnosis here focuses on the learning outcomes as defined in the policy and the challenges in developing curricula that address learning outcomes for quality learning. The question is; what are the most important learning outcomes for the learners to acquire to face today’s and tomorrow’s world?

4. Curriculum: this diagnosis is carryout by scanning of the curriculum with the view to identifying the strong element to be built upon, as well as the weaknesses that hinder education quality. The paramount question is: does the curriculum we have in place enables us to impart on our learners the kind of competencies, values and attitudes we require for the type of society we envision to build?

5. Teachers: the diagnosis focuses on teachers as a critical sub-system that can support or impede achieving the goal of quality education for all. The paramount question to be addressed is: to
what extend the teachers’ sub-system has been a major factor in solving the quality problems we face in our education system?

6. Learning environment: an environment that is physically and socially supportive, influences learning in many ways and contributes to increasing learners’ participation, retention and achievement. The question is: have we assured every learner an environment that is both physically and psychologically enabling to his/her learning and thus conducive to improving the quality of education?

7. Teaching and learning: the diagnosis here focuses on how teaching and learning processes contribute to the quality and equity of general education. The paramount question is: do our teaching and learning processes facilitate or impede the attainment of quality education for all our learners?

8. Assessment: the diagnosis focuses on the extent the existing assessment system is part of the facilitating factors or impediment to reaching the desired stated goals of education quality. The question is: how well the existing assessment system is contributing to improvement of the quality of our education system?

9. Governance: the diagnosis here focuses on the extent to which educational inputs contribute to an equitable, efficient, relevant and responsive quality education, which depend on the overall quality and efficiency of governance and management.

10. Equity and inclusion: here the diagnosis focuses on the current situation of inequalities and exclusion in the education system. The paramount question is: how we managed to create an equitable and inclusive education system, which delivers quality education to each and all?

11. System efficiency: the way resources are allocated, managed and used at different levels of the education system is an important dimension and determinant of quality education system, the question to be addressed is: how can we improve the resources efficiency in our education system to improve education quality and equity?

12. Financing: a well-functioning education financing system is one of the key enabling factors for the delivery of quality education. The paramount question is: how well have we designed our education finance system to enable the achievement of equitable and quality education outcomes?

Therefore, it is important to note that diagnostic assessment could be applied in all teaching and learning process (cognitive, affective and psychomotor domains) in identifying students’
misconception in the content areas for remediation measures. DA could also be used for general education assessment for holistic quality control of education system.

**Models for Diagnostic Assessment for Quality Control in Education**

The following models are recommended for conducting/designing diagnostic assessment for learners’ learning difficulties and general education diagnosis: Item Response Theory (IRT) modeling will be useful for quiz/test form of diagnostic assessment as it can describe item performance at each level of student’s ability. While Empowerment Evaluation model will be useful during interview and self-assessment forms of diagnostic assessment as it is aimed at ‘helping people to help themselves’ (Fetterman and Wandersman, 2007).

For a holistic diagnostic assessment of the education system, the CIPP Model will be more useful as it takes in to consideration the context, input, process and the product of the education system as stated in the UNESCO’S diagnosis framework (GEQAF).

**Challenges of Use of Diagnostic Assessment for Quality Control in Education**

The challenges that could be faced in the use of diagnostic assessment for quality control in education are presented as follows: the problem of large class size with many arms. The ratio of teacher to students in Nigerian schools is a major factor that will impede the use of diagnostic assessment in improving learners’ learning difficulties. It will become practically impossible for teachers to embark on meaningful DA as it is characterized by constant feedback, modification of instructions and information about student’s progress with a large class size.

Non-inclusion of diagnostic assessment in the scheme of work in the curriculum or in the schools’ academic calendar makes it less important and attracts less attention by the teachers as they focus more on formative and summative assessments. Diagnostic assessment is an assessment that requires a lot of processes and procedures to make it effective. As such, lack of dedicated and committed teachers will constitute a serious problem to the setting, administering, marking and scoring of meaningful DA (Adebule, 2005).

Lack of motivation of teachers on the part of government and other employers could also militate against the use of diagnostic assessment to improve students’ learning difficulties. According to Akaonye and Dike (2011), teachers in Nigeria are faced with problems ranging from late payment of
salaries, delay in promotion, lack of fringe benefits and allowances amongst other things. These could impede the implementation of effective diagnostic assessment by teachers in schools.

**Suggestions**

The following suggestions are made on how best to address the challenges facing the implementation of diagnostic assessment in the school.

1. Government should employ more and qualified teachers to reduce the ratio of teacher to students and bring quality in education in Nigeria in line with good international best practices in teaching, learning and assessment.
2. A provision should be made in the curriculum and schools’ academic calendar for diagnostic assessment. This will go a long way in achieving learning outcomes.
3. Seminars and workshops should be organized to sensitize teachers on the importance of diagnostic assessment in the teaching and learning process. Teachers should be provided with adequate training on how to conduct, design and implement the use of diagnostic assessment according to the set standards.
4. Motivation in any human endeavour is essential in achieving the desired result. Therefore, government and other employers in education sector should place the welfare of teachers as a priority for the teachers to give their best in moulding the minds of the younger ones.

**Conclusion**

In conclusion, this paper examined the concept of quality control and diagnostic assessment in education. It gave reasons why diagnostic assessment is important for quality control in education and provided guidelines for implementation of diagnostic assessment. It also recommended some models to use for designing DA, some challenges of implementing diagnostic assessment were identified and some suggestions on how they can be overcome were also made. It is believed that integrating diagnostic assessment in the teaching and learning process would improve students’ comprehension level, reduces their errors, misconceptions and provide timely mediation measures in achieving learning outcomes. It would also lead to reduction in the failure rate in the standardized examinations as well as improving the quality of education in the country in general. Quality human resources are the engine of development of any nation.
References


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