Application of Technology in Validation of Examination in Developing Economies: Kenya's Context

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Abstract

The validity of examinations has continued to attract attention only among researchers but also practitioners. The concern today is how technology can be used to improve the validity of examination results. The main purpose of this paper was to examine the application of technology in validation of examination in Kenya's context. The paper was guided by the following specific objectives: to examine the application of technology in validation of examination, to find out the challenges involved in technology adoption in examination validation and to recommend what can be done to address technological application issues in validation of examination. The paper used secondary data based on past literature. Use of secondary data was informed by the following reasons: provides ease in terms of time, offers a cost-effective way of gaining a broad understanding of research questions and the data are deemed important in providing a ground for designing subsequent primary research. The sources of the secondary data for this study included official statistics, government portals, technical reports, scholarly journals, empirical articles and literature review articles. In order to ensure the validity of data and sources, the researcher determined the original purpose of the review documents, ascertained the credentials of the source(s) and author(s) of the information, considered the date of publication, examined the coverage of the documents and established whether the documents were well referenced. Critical review approach was used in the analysis of the secondary data. The review revealed that there are various stages of examination where technology can be applied. These include examination development, printing and packing of the examination, field administration, and processing and examination results release stages. The key challenges facing technological application include competencies gaps, technology usability limitation, cost factor issue and technology reliability issue. Based on the findings, there is need for developing countries like Kenya to adopt policies that are geared towards embracing the best practices in technology application in order to enhance validation of examination in its totality

Keywords: examination validity, technology application, technology challenges,

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1.0 Introduction

Provision of examination tests in every level of study is central in gauging the suitability of a prospective candidate for the next level of the academic ladder or in other circles of life. Examination is often used as a yardstick to measure or gauge an individual scholarly prowess and potentiality for certain positions in life. Owing to the central role that examination plays in life, its validity is equally invaluable.

In essence, validity of examination is about an exam being able to measure what it claims to measure (Brown, 2010). It is an important criterion to determine the quality of a given test. As such, in examination with high validity, the items would be said to be closely linked to the overall examination intended objective. If the examination has poor validity, then it fails to rightly measure the competencies in a candidate. Consequently, the results obtained cannot be justifiably be used for an intended purpose (Haladyna & Rodriguez, 2013).

In the quest to ensure validity of examination, various measures have been put in place. Key among them is application of technology. Today, technology is used to ensure that the various parameters of examination validity are achieved. It has been used to ensure content validity, concurrent validity and the predictive validity (Professional Testing, 2006). However, the extent to which technology has been used in developing economies like Kenya remains open to questions. This paper therefore is a review of how technology has been used in validation of examination, the challenges involved in technology adoption in examination validation and measures that can be adopted to address technological application issues in validation of examination.

The paper was guided by the following specific objectives:

a) To examine the application of technology in enhancing validity of examination
b) To find out challenges involved in technology adoption in examination validation and
c) To recommend what can be done to address technological application issues in validation of examination

2.0 Literature Review

2.1 Introduction

Ensuring examination validity is one of the most important components of building a health, skilled and competent nation. This therefore necessitates application of the modern day technological advancement in the examination processing stages to ensure its validity is maintained. Application of technology towards improving validity of examinations in developing economies like Kenya can be set at various phases in examination production. These include tests development phase, printing and packing of the examination phase, field administration phase, processing and examination results release phases.

2.2 Application of Technology

2.2.1 Application of Technology in Test Development Phase

Test development is a critical area that determines the whole process of examination. At this stage, various examination experts come together to deliberate the type, nature and content of the examination materials. This stage inevitably necessitates proper handling of the examination materials if the validity of the examination as well as the entire process is to be ensured and assured. Therefore application of technology as a modernized means of curtailing cases of examination frauds becomes important at this very initial stage of examination development. The application of technology at this stage would be critical to ensure that overall functions of the examination administration are adequately coordinated. It would also aid towards ensuring the

use of uniform standard of administration and application of examination policies, procedures and regulations (The Examination Administrators Forum, 2008). The next question is how appropriately can technology be applied at this level of examination process?

To respond to this question on how technology can be used at tests development stage, item banking software for instance becomes vivid in the mind. This is a software designed as an item bank where well written examination test items are securely and freshly kept. An item bank is a robust repository of test questions and the various components that make up those questions items (Vale, 2004). This software presents a standard system that provide tests developers and tests administrators a platform to facilitate the writing, reviewing, editing and selection of test questions. Notably, a well-designed item banking system will ensure the automation, standardization, and scalability essential to developing and maintaining effective as well as the validity tests (examination).

Use of software in test development stage is guided by the best practices including use of Table of Specification to ensure the validity of tests developed. Table of Specification is described as a plan prepared by examination administrators as a primary basis for test construction (Notar, Zuelke, Wilson & Yunker, 2004). Basically it describes the topics to be covered by a given test or examination thus allowing examination administrators to construct a test which have primary focus on the key areas as well as weighting those different areas based on their importance. Thus, application of technology to develop table of Specifications present a justifiable evidence that a given test or examination has content validity and that it covers all the necessary components to be covered.

While there are a number of computer applications that have been developed to aid exam development, their adoption in developing countries like Kenya has not been that fast. Common in use are general computer applications including word process, database based applications and spreadsheet. There is need to embrace more tailor made applications that can enhance examination development phase and therefore ensuring validity.

2.2.2 Use of Technology in Printing of Examination

Use of Technology in Printing of Examination is another critical area where examination leakage can become evident if not well monitored. To reduce human error and insatiable desire to leak the test, the printing process can be automated. According to Konica Minolta (2008), a printing business enterprise based in Germany noted that automation of the printing process helps reduce human interaction with the question papers to minimize chances of examination leakage owing to the many handlers of the examination. When the process of printing is automated, the number of the examination handlers would be reduced and thus reducing chances of examination leakage. Small number of people can easily be contained than a large number of people.

Another approach that can be used is encryption of the soft copy of the exam paper question to maximize the security of the examination. By encrypting the soft copy of the test paper, the number of people who would be able to access the examination would be greatly reduced thereby minimizing to a great deal cases of examination leakages (Professional Testing, 2006). Notably, reducing chances of examination leakages minimizes by default cases of examination fraud. Further, the plain text question papers can be converted into Portable Document Format (PDF) as a way of minimizing chances of alteration after the final proof reading of the examination paper (Castiglionea, De Santisa & Sorientea, 2010).

In developed countries like UK, printing technology has developed in bounds. For instance, use of digital printing technology ensures limited number of human agents (Konica Minolta, 2008). This technology has been used in a number of countries in Europe to improve the validity of examination. Countries like Kenya can borrow from such technologies to improve the validity of examinations.

2.2.3 Administration of Examination in the Field

Administration of the examination paper to the various examination locations can also present a possible loophole for examination leakage. The examination boxes and packets can easily be tampered with and examination questions and answered leaked before the actual day of the tests. Therefore, tracking the movement of examination documents right from the point of dispatch at the printing press to the examination centers is inevitably of a necessity. Use of technologies such as General Packet Radio Service (GPRS) devices to track the movement of the examination document as well as report to the main examination center any sort of tampering of the question paper packets is invaluable (Rempfler & Mathis, 2007). For efficient and reliable, usage of GPRS in tracking the examination movement, centrality of examination administration is essential to ensure adequate coordination of the examination distribution (Torres, 2003).

While this technology has found its application in countries like Kenya, its use in examination tracking has not been embraced. Bearing in mind that the technology is common today, there is need for developing economies like Kenya to re-examine its commitment towards embracing such technologies among others that can be used to enhance the validity of examination.

2.2.4 Processing and Release of Results

Processing of examination which includes marking is another critical stage which can spell either doom or success of a candidate. Use of technology is therefore important in order to reduce human error and to track the process. Tracking systems right at the processing centers can be used to capture the candidates' raw marks at the marking. The use of Examination processing system (EPS) has proven effective in Kenya National Examination Council . The tracking system would be useful to ensure that there are no changes done on the candidates' raw marks during the electronic data capturing of raw scores of candidates. Further, at the marking center, technology can be used to validate the marks scored by each candidate. This would be essential in ensuring that every candidate`s answer script is accounted for.

In the modern times, test-statistical analyses of items have since become an integral component of the examination quality management. This tool enhances automatic statistical analysis and calculation of test score, thus reducing chances of human error during figure manipulation process (UCAN, 2005). The test-statistical analyses of items enables automatic calculation of the test results as well as automatic statistical analysis of the test score which include the question and exam indices. Additionally, owing to the all-in-one toolbox approach that this tool has, the received computed data can easily be exported back to the main item database at the central examination administration center. This automation manipulation of candidates result scores reduces chances of human error and the number of results handlers. It is thus worth noting that by the use of such technological tools, the number of those handling the results would be reduced to a manageable capacity thus chances of scores manipulation is reduced.

Technology can also be applied in the production of statistics that is used in fixing grade boundaries for the examinees for grading candidates. Item difficult profile can also be used to

detect candidates who have cheated in the examination, this has been successfully been used by the Kenya National Examination Council is establishing candidates who participate in examination malpractice in Kenya Primary Examination Education(KCPE). Various technological software has since been developed to curtail cases of examination cheating among students. Software tools such as TurnItin have been used widely in many European based institutions to check students' examination scores or responses against a database of books, journals and previously published papers in the internet (Graham-Mathesona & Starr, 2013)

Technology has also been applied to produce the overall examination reports especially while ordering the merit based mean scores of the candidates. In the recent times, technology has also been used to relay the results of candidates through the means of short messaging services (sms) and online posting (Brink & Lautenbach, 2011).

While use of technology has been used in processing and release of examination in Kenya, there is still a gap in the widespread use of landmark technologies that can greatly enhance the validity of examination. Thus, there is need for countries like Kenya to learn from the best practices in technology application to improve validation of examination especially during processing.

2.3 Challenges of Adoption of Technology in Validation of Examination

The adoption of technology to improve examination validity brings in its wake a myriad challenges especially in developing economies. Although by embracing technological prowess in the present fast-changing environment is one of the surest ways of ensuring quality management in educational examinations, developing economies like Kenya are likely to fall short in its implementation. Needless to say, adoption of the modern technology would require a particular

level of competence and technical knowledge on the various aspects of the technology to be used.

2.3.1 Lack of Competencies

Adoption of modern day technology at the various level of examination development means that some people must be competent enough to instruct the machines. This remains a challenge especially in developing economies like Kenya where technological know-how level is still in growing.

2.3.2 The issue of Usability of the Technologies

The inability to use the modern technology would therefore cripple the very application of technology in improving validity in developing economies (Matti, Markus & Mikko-Jussi, 2014). A good example is adoption of test-statistical analyses of items as a measure to ensure examination quality management. The question is how many people know how to use the tool? As such, usability has contributory role in determining whether a particular technology can be adopted. According to Gilbert (2009), usability is an important factor when starting to use new acquired electronic systems and applying it in examination structure.

2.3.3 Cost Factor in New Technology

The adoption of technology to ensure examination validity especially in developing economies can be expensive both to establish and maintain (Brown, 2010). The adoption of the necessary technological tools/devices for instance, the tracking devices and satellite connectivity, automated printing presses, specified means of transportation and many others would require considerable amount of financial resources which many developing economies may run short of. Madonga, Matswetu & Mhishi (2013) in their work stated that adopting technology as well as ensuring its sustainability, requires lots of resources both to acquire and maintain. In Kenya, for

instance KNEC being an examination body, charged with the responsibility of developing, distributing, computing results and releasing the results may be limited in terms of the necessary financial power to purchase the modern equipment that can be used in all counties in the country. This therefore poses a great challenge on the part of the examination body in developing economies to establish and so maintain the new technologies designed to ensure examination validity.

2.3.4 Technology Reliability Issue

Another problem that is likely to be encountered in the adoption of technology to determine examination validity is the reliability of the technological tools used. In context to this, Darreel & Martin (2002) stated that despite of the wide range adoption of technology in various sectors in the society such as education, technology has proven to be unreliable as not everyone does have the ability to use technology or even access the associated equipment. Although the usability of technology in ensuring validity of examination can be successful within the urban based institutions, the adoption of such new technologies in remote areas can prove difficult. In essence, remote areas with poor infrastructure both in terms of accessibility and technological know-how, the use of technology for examination verification may prove futile.

3. Methodology

This study was based on secondary data related to the application of technology and its challenges in the validation of examination. This kind of data is typically defined as 'second-hand' information which is either gathered by someone else like researchers (Cnossen, 1997).

In this review, secondary data were used for a number of reasons, including: i) secondary data provide ease in terms of time, ii) secondary data, if collected with care and diligence, provides a cost-effective way of gaining a broad understanding of research questions and iii) the data are deemed important in providing a ground for designing subsequent research (Novak, 1996).

The sources of the secondary data for this study included technical reports, scholarly journals and general literature review articles. The data collected from these sources informed the thematic areas of the review.

Data validity is an important aspect of research. It is about the correctness and reasonableness of the data (Davis, 2003). Secondary data are likely to have some errors, which are mainly human. Therefore, in order to ensure the validity of data and sources, the researcher determined the original purpose of the document, ascertained the credentials of the source(s) and author(s) of the information, considered the date of publication, examined the coverage of the documents and established whether the documents were well referenced.

4. Conclusions and Recommendations

4.1 Conclusions

Based on the review, this paper concludes the following:

a) There are various stages of examination where technology can be applied. These include examination development, printing and packing of the examination, field administration, and processing and examination results release stages.

b) The key challenges facing technological application especially in developing economies like Kenya include existence of competencies gaps, technology usability limitation, cost factor issue and technology reliability issue.

4.2 Recommendations

There is need for developing countries like Kenya to adopt policies that are geared towards embracing the best practices in technology application in order to enhance validation of examination in its totality

The paper also recommends establishment of clear lines of responsibility for checking and maintaining quality control of technology in order to improve its reliability. In this case, regularly checking, maintenance of key component and consistent software upgrade also increases its reliability.

In order to counter the issue of technology usability, examination officials should be adequately trained on how to apply various related technologies. Training should also be aimed at breaking certain mindsets associated with resistance to new technology adoption.

Owing to the issue of cost in acquisition of new technologies, there is need for the involved government ministries to work hand in hand with other development partners. Such partnerships encourage knowledge and technology transfer and ease cost burden.

More often than not, technologies are labeled for lack of reliability in certain instances. Thus, sound mechanisms should be put in place in order to validate the very reliability of the adopted technologies in order to ensure high examination validation standards.

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