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**ANALYSIS OF STUDENTS' ACADEMIC PERFORMANCE IN PEN ON PAPER AND E-EXAMINATIONS IN THE DEPARTMENT CONTINUING EDUCATION, UNIVERSITY OF MAIDUGURI**

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### Abstract

The study analysed students' academic performance in pen-on-paper and E-examination in the Department of Continuing Education and Extension Services, University of Maiduguri. The study was guided by three objectives and one hypothesis. The study adopted ex-post factor research design. The target population used were part 3 students of 2018/2019 session and part 4 students of 2019/2020 session with total number of One hundred and Seventy (170) students. Data was analyzed using descriptive statistic of frequency count, percentages, mean, standard deviation and t –test of independent mean to answer the research questions and the hypothesis. Proforma was also used to collect the results of the students. The proforma is a format developed by the

researchers to collect the information on students' performance that contained ID number, Results of the sessions per semester during the aforementioned academic sessions. The result showed that the students performed very well in E-examination with the average of 3.49, while their performance in pen- on- paper with an average mean score of 2.96 was below compared to those who were subjected to E- exams mode.. This shows that the students performed better in E-examination. Based on the findings, the following recommendations were made among others: The University management should allow students to continue with E-examinations for better results, and at the same time should encourage the use of pen on paper during continue assessments tests to enable students retain the skills of writing.

**Keywords:** Analysis, students, Academic Performance, pen-on-paper, E-examination

## Introduction

Academic performance presently is a major issue among students, teachers, parents, school administrators, and the community at large. Researchers have made several attempts to unravel the complexities surrounding academic performance. For example, psychology researchers have put forward a lot of reasons why disparities in achievement among young people exist as it has been noted by Hussain, (2014). A lot of attention had been paid to external factors such as type of school, methods of teaching, school location, instructional materials, quality of lecturers and their experience and also method of measuring students' academic performance, which is evaluation and modes of evaluation (Otunda *et al.*, 2015).

Academic performance is considered an intellectual competence indicator. Opinions vary as to why some students excel academically while others appear to be underachievers. As a result, many psychologists have consistently attempted to identify the major predictors of individual academic performance. Academic performance on examinations is the result of interactions among multiple variables such as methods of teaching and learning. Learning occupies a significant role in the life of students, it means modification of behaviour that is measured using the yardstick of academic performance such as examination or test (Mangal & Mangal, 2015). In the past, academic performance of University students was not measured using the present form of using numerical method. Teachers' observations made up the bulk of

the assessment, and today's summation, or numerical, method of determining how well a student is performing is a fairly recent invention. Grading systems came into existence in Nigeria in the late 19<sup>th</sup> Century and were initially criticized due to high subjectivity. However, performance results also allow students to be ranked and sorted on a scale that is numerically obvious, minimizing complaints by holding teachers and schools accountable for the components of every grade.

Academic performance in this research is defined by students' reporting of previous semester GPA and their expected GPA for the current semester. The grade point average or GPA is now used by most of the tertiary institutions as a convenient summary measure of the academic performance of their students. The GPA is a better measurement because it provides a greater insight into the relative level of performance of individuals and different groups of students. Academic performance is the extent to which students have achieved their short or long-term educational goals. Cumulative grade Point average CGPA and compilation of educational degrees such as High School and bachelor's degrees represent academic performance. For the purpose of this study, the researcher's definition of academic performance of students will be as follows: Academic performance is characterized by the overall performance in each year which culminates in a Grade Point Average (GPA). The GPA score would take into account students' performance in test, course work and examination. The minimum and maximum GPA score are 0 (Grade F) and 4.0 (Grade A) respectively. This GPA score implies that the higher the score, the better the students had performed academically.

As such, the GPA will be a good measure of students' academic performance university senate approved grading system.

Academic performance is commonly measured through examinations or continuous assessments at the end of teaching and learning each semester, but there is no general agreement on how it is best evaluated or which aspects or methods are most important procedural knowledge such as skills or declarative knowledge such as facts. Furthermore, there are inconclusive results over which method of measuring students' academic performance is the best elements such as test anxiety, environment, motivation, and emotions require consideration when developing models of school performance (*Damenech, 2019*).

Individual differences in academic performance has been linked to differences in intelligence and personality. Students with high mental ability as demonstrated by IQ tests and those who are higher in conscientiousness (linked to effort and achievement motivation) tend to achieve highly in academic settings. However, non-cognitive factors or skills, are set of "attitudes, behaviours, and strategies" that promotes academic success, such factors include academic self-efficacy, self-control, motivation, expectancy and goal setting, emotional intelligence and determination (*Annie et al., 2018*).

But individual differences in academic performance have been linked to differences in intelligence, personality and means of measuring performance (*Agada, 2008*). Showed that there are also factors responsible for high academic performance of students in Nigerian Universities. Erle, Benjamen, Einar and Raymond (2006) *asserted* that mode of assessing students is now a relevant factor studied in relationship

with academic performance. For some researchers another major factor that is believed to be responsible for low academic performance in students is the fear of mode of measuring their academic performances.

However regular and periodic examinations still remain one of the means of measuring students' academic performance objectively. Darrell (2003), asserted that Pen- on- paper examination has been the traditional or conventional way of conducting examination. In this mode, students answer questions presented to them using Pen- on- Paper, questions are printed on paper and then answer sheets are provided where students write answers to the questions asked. Invigilators usually monitor the examination to curb malpractices and strict adherence to the rules (e.g duration, number of questions to be answered) governing the examination. When all these are done, answer scripts must be marked and results collated. Pen-on- Paper-based examination also calls Pen- on- Paper Test (PBT) though it is easy to set questions for pen-on- paper examination by the lecturers. The process of the examination and marking are time consuming, the delay in writing and marking sometime affect the school calendar and graduation of those that have finished their programme The researchers have also observed that during the period when pen- on- paper were being used to write examination, students were being seen reading especially in the night around any available light within the campus. Many spent the night discussing among themselves. The various groups also organized group discussion to explain courses contents to their fellow members. With the introduction of E-examination, it is easy to write and submit result without any delay, however the researchers observed that students no longer spend their time in

reading. Secondly the issue of tutoring each other among the students is gradually fading away. The predominant mode of testing students' academic performance in Nigeria's Educational system in the past was the Pen-on- Paper based. Over the years the system is characterized by different form of examination malpractice, delay of the result and time consuming in terms of writing and marking for example computer based can take twenty (20) to thirty (30) minutes but with Pen and Paper it take two (2) to three (3) hours, it is also observed that students don't read more in the E-examination era unlike when it was pen-on - paper. In the present days mode of measuring students' academic performance is increasingly becoming difficult to equate competence of people with supposed academic performance as represented in their certificates. Many candidates are unable to defend the result they supposedly acquired honourably (Daniel, *et al.*, 2018).

However in University of Maiduguri the E-examination means Computer Based Examination which means the candidate sits in front of a computer and the questions are presented on the computer monitor and the candidate submits the answers through the use of keyboard or mouse. The E-examinations or computer-based tests are not entirely new inventions in the educational system. They have been used since late 1960s to test knowledge and problem solving skills (Ubogu, 2019). The introduction of e-examinations has allowed educational administrators and other stakeholders in the industry to objectively monitor students' performances in examinations in recent time. There are so many types of e-examinations but two of them are quite popular. There is the one that requests candidates to send responses in an

Optical Mark Reader (OMR) form which is later fed into a computer to mark. This machine then goes on to read the scores of candidates from the paper and report them almost instantly.

Other features of the computer-based assessments where the computers themselves provide the interface with the candidates to input their choices of answers and receive their scores in form of near-instant feedbacks from the same computer(s) (Ubogu, 2019). Most studies on computer-based examinations have traditionally placed emphasis on candidates' precisions on their responses and higher-level feedbacks as outcomes. The candidates' experience and comfort with computers have received relatively little attention in the field of computer-based assessments. The main chunk of the computer-based examinations' literature written so far have done little about the students' experience with computer especially in Nigeria. Many have argued that the e-examinations are the most effective techniques for measuring students' academic performances and prevents examination fraud. The rise in the number of students in Nigerian universities is becoming additional burden on academic staff in many Nigerian Universities. As a result of this, the use of e-examinations is fast becoming attracting a good option of assessment in many of our Institutions of higher Learning. However, despite the flattering appeal of the technique of E-examinations, in most Nigerian institutions, the pen and paper-based examination a combination of essay examination and practical examination is still prevalent in assessing students' academic performance (Alabi, Isa & Oyekunle 2011).

It is assumed that all those admitted into the University of Maiduguri irrespective of the mode of entry will be able to cope with the academic rigorous but contrary to this expectations, some drop out on the way without graduating from the university, yet some change their courses and others spend extra year(s) before graduating as can be seen with the extension of studies, some students end up with pass and third class degrees. This scenario shows that performance may be a function of the mode of examination.

University of Maiduguri, since 2007, has witnessed an increase in the number of students and the conventional examination method became time consuming in terms of the time for evaluation and assessment. E-examination was introduced by the University of Maiduguri in 2014, primarily to address the problem of examination malpractice and large examination takers among others. University of Maiduguri in its strategic plan adopted the use of ICT in conducting examination especially at undergraduate levels. The rationale for the development and integration of educational technologies in the University was to fast track two priority areas in the University's five year strategic plan, they are: Expanding access and participation and enriching quality academic programmes through the infusion of ICT as Computer Based Test or E-examination as it is called in the institution. To support ICT for assessment purposes in the University therefore, the executive management of the institution committed resources for the development and improvement of the teaching and learning environment. During the period spanning over 2014 and 2018 in University of Maiduguri, adoption of E-examination was encouraging as shown by the increasing

numbers of courses that has been written in E-examination format.

As it happens with any technology, its implementation is not free from challenges: incapacity to evaluate high-order thinking competence, lack of security in the delivery of e-exams and the inappropriateness of technological infrastructures. (Miguel, Caballé, Xhafa and Prieto,(2014) argued that security requirement cannot be accomplished with technology alone, hence new models such as trustworthiness approaches could complete the technological solutions and support the e-learning requirement .In addition to these, while paying attention to the merits and benefits of e-examination technique, it is pertinent for us to critically examine the connection between the mode of examinations and the attitude of students being assessed. This is because, it will be difficult to measure the efficacy of any assessment mode without factoring in students' attitude towards the mode of assessment. It is observed that students in the University of Maiduguri have expressed negative opinion about the E-examination mode, that they find it difficult expressing themselves through the e-examination mode, that the time allocated for each examination are not adequate hence they find it difficult typing fast to meet the time allocated for each examination.

Despite the advantages of the use of computer in the examinations many people especially lecturers in the University of Maiduguri are complaining about the E-examination mode in a negative way. The researchers were opportune to have had a privileged information about what was discussed in a meeting by different lecturers about how they feel or perceived the E-

examination mode in the institution, that the E-examination mode has implications on quality of University education, as quality is believed to have been compromised by the quantity of universities and the method of E-examination. Quality is related to standard; therefore the standard of university education can only be achieved through evaluation process, E-examination are often interpreted as pure multiple-choice tests, only suitable for the repetition of factual knowledge but not to address higher cognitive levels like understanding, synthesis, analysis or judgment, the quality of examinations constricted to closed, automatically valuated questions is often seen as a didactical step backwards and as being not worthy for a higher level of academics, there may be a higher risk of (e-) cheating, e.g. by hacking the database of the question items, a risk of total loss of examination data or a lower security of sensitive personal data, some lecturers may be discouraged by the time consumption caused by the initial development of numerous questions with well-tested scoring parameters, subject to a laborious quality assurance (Unimaid Quality Assurance Directorate). The system is characterized by different form of examination malpractice; delay of the result and time consuming in terms of writing and marking while computer based can take twenty (20) to thirty (30) minutes to answer 35-70 questions but with Pen- on- Paper it take two (2) to three (3) hours, it is also observed that students do not read more in the E-examination era unlike when it was pen- on- paper. In the present day, mode of measuring students' academic performance is increasingly becoming difficult to equate competence of people with supposed academic performance as represented in their certificates. Many candidates are

unable to defend the result they supposedly acquired honourably. This desire to see this problem curbed gave rise to this study and the researchers' aim is to compare the academic performance of students' in Pen- on- paper and E-examinations to know the method that can be best used for sound academic performance that can make both the students and the lecturers proud.

### **Research Questions**

1. What are students' Academic Performances in E-examination?
2. What are students' Academic Performance in Pen on Paper Examination System?

### **Research Hypothesis**

**Ho<sub>1</sub>**. There is no significant difference in the students' Academic Performance in E-examination and Pen on Paper examinations.

### **Methodology**

The study adopted an Ex-post Facto research design. In the study, the Ex-post facto design was used because the phenomenon under investigation (Academic Performance) had already taken place, and it was possible to compare groups differentiated in terms of some independent variables. The design is used because of the tendency to yield useful information regarding the possible differences in academic performances. The target population for the study was the part, three and four students, who have had the experience or had written both examinations that is pen-on-paper and E-examinations. The part three students had written pen-on-paper in their part I and II and E-examination in their part III, while those in part IV have had experience of both examination types, that is pen-on-paper and E-examinations. They have written pen-on-

paper examination in part II and E-examination in parts III and IV.

The number of students used in part four was determined since the number of students are not the same, because some of them might have dropped or repeated, therefore those that pass to part four first semester 2019/2020 session and 2019/2020 sessions are the sample size and their total is 170 students and their result for the first semester part three for the E-examination were used to compare their performance in E-examination and Pen on Paper examination, they are selected based on their I.D numbers.

A Proforma was used to collect data from the academic records of approved results of the first semester part three of 2018/2019 session for the E-examination and the First semester part four of 2019/2020 session for the pen on paper examination. The proforma is a table that is used for collecting data from the source material. It contained a serial number, I.D number of the students, results in the first semester 2018/2019 session, and that of the first semester 2019/2020 session. The I.D Numbers of the students were selected from their part three results, the result of part four students that have passed only. The researcher was not interested in the number of students that repeated and those that dropped out. The researcher seek approval from the Head, Department of Continuing Education and Extension Services to collect the results of first semester part three students in 2018/2019 and first semester part four students in 2019/2020 for E-examination and Pen on Paper respectively, from the level coordinator. The statistical tool employed was SPSS version 26.0 to analyze the data using the descriptive statistic of frequency count, percentage, mean, standard

deviation, and t-test of Independent mean to answer the research hypothesis.

## Data Analysis and Results

**Research question 1:** What are students' academic performances in E-examination?

**Table 1:** Frequency Distribution of Students' Academic Performance in E-examination Based.

Grade	Frequency	Percentage (%)
F	0	0.0
D	44	25.9
C	35	20.6
B	54	31.8
A	37	21.8
Total	170	100.0

Table 1 shows the average distribution of students' academic performance in E-examinations. The results indicate zero percent failure in the courses took, 31.8% of the students had a very good performance, 21.8% performed excellently well while 25.9% passed respectively. This shows that despite the fact that students complained of lack of time and inability to operate the computer very well, the failure rate of 0% was reported. While 21.8 % of the students obtained A and 31.8% of the students obtained the B grade, also 20.6% obtained C grade and 25.9% obtained D grade with 0.0% of F grade that indicate the students have done well.

**Research question 2.**What is students' performance in pen on paper examination system?

**Table 2:** Average Distribution of Students' Performance in Pen on paper Examination

Grade	Frequency	Percentage (%)
F	21	12.4
D	41	24.1
C	36	21.2
B	47	27.6
A	25	14.7
Total	170	100

Table 2 show 12.4% failure rate among students, 24.1% had a pass, 21.2% had good performance, 27.6% performed very good while only 14.7% had good performance among others on average distribution of students' academic performance in pen on paper examination (see Table 2). This shows that students' performance is good in pen on paper examination with the failure rate of 12.4% was obtained in the pen on paper examination. On the other hand in the pen on paper examination 14.7% of the students obtained A and 27.6% of the students obtained the B grade also 21.2% obtained C grade and 24.1% obtained D and 12.4% obtained F.

Ho: There is no significant difference between students' Academic Performance in Computer Based and Pen and paper Examinations

**Table 3:** Summary of Independent-Samples t– test Analysis on Students' academic performance in computer based and pen on paper examinations

**n = 170**

Exams Type	Mean	SD	t-value	p-value	Decision
Pen on Paper	2.96	1.493	-3.764	.006	Significant
E-examination	3.49	1.100			

The results in Table 3 showed that pen and paper exams had lower academic performance scores ( $M = 2.96, SD=1.493$ ) than computer based exams ( $M=3.49, SD=1.100$ ). An independent t-test found this examinations to be significant,  $t(338) = -3.7640, p < 0.05$ . Therefore, the null hypothesis of no mean difference in the examinations is rejected and alternate hypothesis is accepted that there is a mean difference in the examinations.

### Findings

The result of data analyzed revealed that:

1. Students performed very well in E-examination even though they complained, lack of time and inability to operate the computer very well.
2. Pen on Paper results revealed that the students had an average performance on the distribution of students' grade performance.
3. Students performed better in E-examination with an average mean of 3.49 than pen on paper examination which recorded 2.96 mean, this means E-examination is better than the Pen on Paper examination.

### Discussion of Findings

This study was based on Comparative analysis of the academic performance of students' in E-examination and Pen on Paper Examination of final year students of 2019/2020 session in the Department of Continuing Education and Extension Services University of Maiduguri. In this study, data were collected from the Academic record of students who wrote the E-examination and Pen on Paper examination respectively.

The Independent-Samples t-test analysis on students' academic performance is less than the significant level, this exhibit a significant difference between the students' performances in E-examination based and pen on paper examination conducted by the Department of Continuing Education and Extension Services University of Maiduguri, Borno State. This is in support to a study conducted by Oduntan, and Ojuawo (2015) on Comparative Analysis of Student Performance in Paper Pencil Test (PPT) and Computer Based Test (CBT) Examination System where result showed a positive correlation in the scores of students and therefore concluded that, if students are well prepared for the CBT exams, their performance will be enhanced.

The results also revealed that there was a significant difference at (0.05) between the mean scores of the E-exams group and that of the pen on paper group on the t-test in favour of the E-exams. In other words, the E-exams affects positively on students' academic performance rather than pen on paper exams. These findings are in relation to studies by Bodmann & Robinson, (2004) and Chua and Don, (2013). There are several reasons for these positive advantages of implementing E-exams as an approach of assessment, for example; the varieties of the interfaces, such as the use of graphics allows a dynamic presentation of the test content. Furthermore, E-exams allow other measures relating to cognitive and perceptual performance.

Further, analysis was performed to examine the number of students who scored A grade, those who scored B grade and C and those who scored D grade and less for both E-exam and Pen on paper exams. Comparing the modes of examination types, in terms of

overall performance, those sat for E-exams performed better, compared to those sat for the examination using Pen-on-paper mode, as rightly observed in this study that none of those who sat for E-examination failed, while a failure was recorded among those who took the examinations via pen-on-paper mode.

The result indicates that the E-examination and pen on paper examination versions were not equivalent. Despite being identical in length, item content, and sequence, they did not meet all the criteria for score equivalence as established by the American Psychological Association's (APA) Guidelines for computer-based tests and interpretations (1986). Although the dispersions of the mean were approximately the same, the distributions of the test scores on the two test versions were significantly different. Contrary to study by Bodmann and Robinson (2004) on the comparability of computer-based and pen on paper tests, the subjects in this study achieved significantly higher scores on the computerized test than on the pen on paper test.

The performance of students in pen on paper was found to be less than that of E-examination, this may be as a result of the attitude of students in using shorthand and wrong spelling, it could also be as a result of their inability to write and explain as required in pen- on- paper examination. Usually, E-examination comprises of fill in the blanks, MCQ and True or False. However, their ability to write is decreasing. This finding does not concur with the work of Lynch,(2000) who concluded that there were significant differences between the students' academic performance in E-examination and Pen- on- Paper

examination, the pen-on –paper group of students scored significantly better than the Computer –based group. He however concluded that the students’ performance was not affected badly after a familiarization period of computer based Assessment (CBA).

It has been observed that students generally are becoming interested in the use of a modern method of assessment, which is the E-examination-based. During the analysis, it was clear that the performance of the students in the E-examination mode was better than their performance in the pen- on-paper examination mode.

### **Conclusion**

The researcher concluded that students’ performance is not based on the method used in examination whether E-examination or Pen- on -Paper Examination, it is clear that based on the result of the study the students’ performance is not based on the method used in examining them but it is based on individual intelligence and ability. That is to say, any method employed to examine the students, they will perform better as shown in the result of the study. Both E-examination and pen-on-paper should be maintained since the students performed well. That E-examination should be maintained for part three and four students’ examination to boost their CGPA and ease the processing of their graduation. Pen on paper examination also should not be neglected, it should be recommended for parts one and two to enable them to maintain the skills of writing and expressing themselves in writing. This will enable the students to have both experience and skills for the E-examination and pen- on- paper examination since the disparity between the two examination methods is not much.

### **Recommendations**

Based on the findings, the following recommendations were made among others: The University management should allow students to continue with E-examinations for better results, and at the same time should encourage the use of pen on paper during continue assessments tests to enable students retain the skills of writing.

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