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DIGITAL DISRUPTION AND PERFORMANCE OF TERTIARY INSTITUTIONS IN NIGERIA: A CASE STUDY OF NNAMDI AZIKIWE UNIVERSITY, AWKA

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ABSTRACT:

The study verified if technological innovations have, in anyway, impacted upon the pedagogical landscape of Nigeria institutions of higher learning. It specifically identified the various school activities which includes student affairs activities, staff matters activities, teaching and learning activities and then use them to proxy institutional performance. The study generated primary data through online questionnaire administered on a population consisting of all registered students and all academic staff of Nnamdi Azikiwe University, Awka, Nigeria. The researchers employed one sample T-test aided by SPSS to analyze the research data so generated. Findings showed that digital innovations have positive significant effect on the various school activities. In order to sustain the positive effect of digital technology on educational performance, the study recommended regular training of academic staff with a view to keep updating their knowledge and skills in the use of technology for enhance performance.

1. INTRODUCTION

Methods and procedures by which some activities were carried out about 3 decades ago are no longer the same as it is today as companies continue to invent new ways that promote efficiency in resources utilization and continuous improvement in the quality of products and services. It is an obvious fact that change will continue to occur in our environment and the desire to remain relevant, has put a demand on business entities to adapt to the changes in the competitive world and live with them. The 21st century is no doubt an era of technological innovations with the propensity of reshaping existing business models and facilitating the emergence of new ones wherein repetitive and mundane tasks are becoming less important thus the need for high-level skills becomes compelling so as to be able to cope with the new demand. According to Zang, Jun and Miklos (2018), the rapid pace of technological change

has continued to disrupt traditional procedures in all spheres of business endeavors both the manufacturing and service sectors. They submitted that the massive wave of digital disruption being experienced in the business world today will most likely result in substantive reduction of manual labour requirement. In the same way, Hooman (2017) had earlier pointed out how the electronic industry was revolutionalized in the 1990s when the introduction of transistors disrupted the relevance of vacuum tubes. Incumbent firms that embraced the new technology remained afloat while those that stick to the old order and never let go the vacuum tubes model suffered the consequences of extinction. According to Zhang et al (2017), while digital innovation reduces manual labour requirement, it however, demands for more employees with requisite IT and data analysis skills. Thus, the advent of disruptive technologies is forcing participants in the business world to learn new skills, especially IT, statistics, and modeling. The educational sector is not an exemption as it operates within the same volatile environment and to measure up with the constantly changing needs in the pedagogical landscape, the education model should be fine-tuned accordingly. Our study is focused on digital innovation in the university system, precisely on how it has impacted on the various activities of the universities.

In a typical university setting activities such as students registration, other documentations and project defense, staff documentations, staff meetings, lecture delivery, conduct of exams, staff appraisal etc are usually carried out at every faculty and departments. The aforementioned activities can be conveniently grouped into (1) students affairs activities where we have such activities as students registration and other documentations, project defense et cetera (2) staff matters activities such as staff documentation, staff meeting , staff appraisal et cetera (3) teaching and learning activities such as lecture delivery, examination, presentation of examination result et cetera. Until recently all the aforementioned activities in tertiary institution used to be manual based which is often characterized by large amount of paper work, high level of physical presence and repetitive activities. Technological innovations such as Robotic Process Automation (RPA), Artificial Intelligence (AI), block chain, smart contracts, Advanced Analytics, Internet of things etc have reshaped existing business models by enabling business activities to be conducted electronically hence reducing the amount of paper work and high level of physical presence. For students' affairs activities, student registration and documentation can now be done online, project defense are now done virtually too. On staff matters, activities such as staff documentation, staff meetings and staff appraisals are carried out virtually. Again on teaching and learning activities, class lectures are now prepared and delivered online and even on real time. In some cases examinations are conducted electronically and the results are now accessed online. Conference and seminars are now conducted online too.

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In spite of the aforementioned areas where digital innovations are been embraced in the educational system, arguments have variously been put forward in support of the traditional teaching model. Keith and Brittany (2021) noted that increased adoption of online learning has created stress for faculty and resulted in academic setbacks for students. They further maintained that while online lecture promotes accessibility to education, in the long run, medical challenges arise due to excessive use of technology to the eyes and the backs, resulting from increased screen time and longer sitting times. Similarly Tatenda (2022) argued that the conventional school has served well before the coming of technological disruption. They maintained that teacher-to-student interaction and social connection are usually enhanced by a physical campus and learning environment which is missing in the online and virtual modes. In additional to that, ethical conduct, quality and reliability were cited as challenges associated with online studies. Despite the arguments in favor of the conventional model, the fact remains that technological innovation continue penetrating into every facet of human endeavors. This study assesses whether digital technology has made any meaningful impact on the performance of Nigerian Universities.

1.1 Objectives of the Study

The study seeks to determine the effect of technological innovations on performance of Nigerian Universities. Specifically, the study:

a. assess students' satisfaction with online school activities with regards to student affairs
b. assess staff and management satisfaction with online school activities with regards to matters relating to staff, teaching and learning

1.2 Hypotheses

To guide the direction of this study, the following hypotheses, in their null forms, are put forward

H_{o1}: Digital innovation has no significant effect on performance of tertiary institutions particularly on student affairs activities

H_{o2}: Technological innovation has no significant effect on performance of tertiary institutions with reference to staff, teaching and learning activities

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2. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Digital Disruption

According to Oxford dictionary, to disrupt means to make a break into something often times resulting to disorder. Thus disruptive means having the capability to interfere and change the course of order. Other words for disruption could be disturbance, interference, interruption. Disruption could be seen as interference to an existing situation of a thing resulting into a change in status of that thing being interfered with. An act or process of disrupting something means a break or interruption in the normal course or continuation of some activities or processes. A disruption could happen in an existing company's supply chain when the new product / service of a new entrant become the choice of the people and gradually dominate the market. The term, "disruptive innovation" was popularized by the American academic Clayton Christensen and his collaborators beginning in 1995 (Wikipedia 2023).

Culture, current trend, government policy et cetera could have disruptive characteristics. Our study is focused on digital disruption which is the disruption attributable to the impact of technological innovation. It could be a radical change to an existing industry or market due to new technologies. In the words of Michael, (2012) disruptive technologies are those that disrupt established practices, often starting with a small number of users, but growing over time to the extent that they displace a previously dominant, incumbent technology. But digital technology was primarily intended to improve upon existing process, product or service and not to uproot and supplant it. This is amplified by Christensen and Raynor (2003) when in their argument changed the term disruptive technology to disruptive innovation on the premise that the disruption is not an intrinsic feature of the technology, but, instead, emerge gradually through practice overtime. Unfortunately, today's vibrant digital economy has shifted the concept of disruption to become the main product of innovation, rather than a byproduct (Adams, 2021). Christensen (1997) had earlier opined that technological innovation may not all the time be disruptive but could be sustaining too. They opined that sustaining innovations are technologies that enhance the performance of existing technologies. While the sustaining technologies improve the performance of an existing process, product or service, disruptive technologies bring to market a very different process, product or services than had been available previously.

2.1.2 Business Model

In theory and practice, the term business model is used for a broad range of informal and formal descriptions to represent core aspects of an organization or business,

including purpose, business process, target customers, offerings, strategies, infrastructure, organizational structures, sourcing, trading practices, and operational processes and policies including culture (Geissdoerfer, Martin; Savaget, Paulo; Evans & Steve, 2017). A business model is described as the architecture for value creation, value delivery and a firm's mechanisms to capture the market (Neele & Thomas 2019). Value here refers to attribute of the product / service to satisfy the customer. Due to the fact that a business model with disruptive characteristics will most likely redefine the meaning of value creation and capture (Cozzolino, Verona & Rothaermel, 2018), a firm that is proactive to the dynamic business environment must be in a constant look out for customers' need and redefine its value by adjusting its business model accordingly.

2.1.3 University Activities

For convenience, this study has broken down university activities into three broad categories to be Student affairs activities, staff matters activities and teaching and learning activities

2.1.3.1 Student Affairs Activities- These are activities relating to student admission into the university, student registration for courses, class attendance, project defense, unionism and general conduct of the student. Registration of newly admitted students conventionally demands physical presence of student on campus whereby a lot of paper documents and files are handed to the student for filling and submission within a specified period of time. Again, class attendance and project defense require physical presence of all the relevant parties before the business of the day can be transacted. Attendants for lectures are conventionally face-to-face interaction between the lecturer and the student and in the same vein, project defense requires that student physically appear before a panel of examiners to defend his thesis.

2.1.3.2 Staff Matters Activities- these activities involves matters such as staff files and other documentations, staff meetings, staff appraisal, conferences, workshops, seminars etc. Staff documentation / filling and appraisal usually demand a lot of paper work. Information about staff bio data, academic qualifications, work experience, current status, faculty, department, job specification etc about the staff are usually documented on papers and circulated to various units such as medical unit, personnel unit, payroll unit, pension and gratuity unit, relevant unions, faculty, department etc and this involves a lot of paper usage. Again, attendant to various staff and committee meetings traditionally require physical presence of the attendees to at least form a quorum. Workshops, conferences and seminars have always been by physical presence at a specified venue.

2.1.3.3 Teaching and Learning Activities- this includes such activities as lecture delivery, examination, presentation of examination result etc. To effectively deliver lecture to student traditionally demands the physical presence of both the lecturer and the student. In the same

way, effective conduct of examination requires the physical presence at the examination hall, of both the student and examiner.

Our preliminary investigation revealed that Nnamdi Azikiwe University, Awka is among the tertiary institutions in Nigeria that have deployed digital technology to improve its performance in her various activities as relating to student affairs, staff matters and teaching and learning activities as part of the steps towards becoming one of the first 200 in global university ranking.

2.2 Theoretical Review

2.2.1 Activity Theory

The theory is originally traced to the Soviet psychological activity theory pioneered by Sergei Rubinstein in the 1930s and was later advocated for and popularized by Alexei and Vygotsky, (2018). The theory posits human actions (that is activity) to be purposeful interaction of a subject with an object through the use of tools. Vygotsky's (1978) triangular model of human activity illustrates his theory that human beings (the object) deploy tools (mediator) as they interact with their environment (object). Fjeld, Lauche, Bichsel, Voorhorst, Krueger and Rauterberg (2002) submitted that tools, as used in this context, is broad and can involve stationary, digital devices, library materials, or even physical meeting spaces. Activity theory has variously been used by researchers in assessing the impact of digital innovation in the pedagogical landscape. Scanlon and Issroff (2005) and Hardman (2005) have at various times referenced Activity Theory when assessing the impact of digital innovations in higher institution of learning.

This study is anchored on activity theory since it is intended to assess the effect of digital innovations on the activities of higher institutions of learning. The activity theory appreciates the development (enhancement) or complete transformation (disruption) that may occur as a result of the interaction between the subject and the object (Field et al, 2002).

2.3 Empirical Review

Abhay (2022) who assessed disruptive technology in higher education with particular focus on library and information Science concluded that digital innovation has performance challenge due to the fact that it is new and appeals to limited audience and may not yet have a proven practical application. They opined that the disruptive technologies are though not specifically designed to disrupt teaching and learning in higher education, but have pedagogical potentials

Blin and Munro (2008) who found large scale adoption of digital technology within the university in Ireland, concluded that just little disruption of teaching practices occurred as the innovations were used to enhance the existing instructional approaches. This was emphasized further by

Christensen and Eyring (2011) who argued that higher education in the USA has also adopted the sustaining technology approach, citing that introduction of computers in the classroom were used to enhance the existing instructional approaches, rather than to supplant them. Lectures were augmented with computer graphics, but the lecture itself persisted in its fundamental form.

Hooman (2017) examined the role of disruptive innovations in distance learning and how they have impacted on business education. The researchers identified the mediating tools of distance teaching to have improved overtime from radio and television to internet enable and life Web-based Synchronous Instruction. They however expressed concern over complacent attitude of some faculties towards online teaching model which they termed cultural and technological gap between teachers and students. The study recommended business school administrators to proactively an assertively familiarize their faculty with the online teaching model. It also advised that faculty members be mobilized and motivated to appreciate and embrace the online learning model that distance education brings to their students.

Sarah (2005) examined issues in the relationship between technology and practice. They argued that despite that current technologies allow people to share information, and not the more complex levels of communication that are possible in face-to-face interactions, technology has improve interaction by providing enhanced forms of communication. The researchers maintained that by way of appropriate use of discussion forums or e-portfolios digital technologies are there to make teaching and learning more insightful. These cited Rowsell (2004) who had earlier submitted that with digital technology one can become a better teacher and a more reflective learner. Tatenda (2022) assessed the role of disruptive technologies in higher education. The researcher traced the relevance of innovation in Higher Education down to challenges of digital technology in Higher Education and the Future place of digital technology in higher education. They viewed disruption in the educational standpoint as that having to do with solving the challenge of lack of access to education, affordability, flexibility, and the creation of an array of opportunities for the future world. The study concluded that challenges being faced in the conventional higher education systems can to a greater extent be solved by adoption of digital innovations modes.

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In order to understand how current literature have described events and actions leading to disruption, Neele and Thomas, (2019) in his study which he titiled ‘’Disruptive innovation from a process view: A systematic literature review’’ carried out an extensive review of extant studies which revealed what they describe as a continuous interconnections of events and actions over time occasioned by innovation which are brought into the business setting by the new entrant and how the incumbent was able to respond to it. Their study found that what constitutes a larger part of disruptive process was the development of disruptive technologies and their integration within business models.

Assink (2006) assessed why large firms often fail to be proactive in developing disruptive innovations. They identified inability to unlearn obsolete mental models, a successful dominant design or business concept, a risk-averse corporate climate, innovation process mismanagement, lack of adequate follow-through competencies and the inability to develop mandatory internal or external infrastructure as factors that often inhibit the development of disruptive innovation. The study further revealed that there exists a vast gap between intention and actual disruptive innovation capability and recommended that company's strategy for growth should include developing distinctive capabilities to bridge this gap so identified.

In their study on Disruptive Technologies, Chandra, Anjali and Pavithra (2021) opined that established firms often find it difficult to handle disruptive innovations if they are not proactive to be on a look out for even relatively minor shifts that lead to changes in systems relationships. Such little shift could have disruptive potentials on the incumbents. They concluded that such innovations attack the relevance of the architectural knowledge of established firms, and since architectural knowledge tends to be rooted in the structure and information-processing procedures of established organizations, the destruction becomes difficult for firms to recognize and hard to correct.

Joydee (2021) in his study titled A Review of the Impact of Disruptive Innovations on Markets and Business Performance of Players critically analyzed related literatures on disruptive innovations. Their study focused on determining the effect of disruptive innovations on revenue generation of the firm as well as on customer satisfaction. They concluded that firm’s revenue generation as well as customer’s continued patronage is usually impacted upon by disruptive innovations. They argued that any firm that fails to account for the effect of disruptive innovation on its business model is bound to lose substantial market share to emerging players in the industry.

Karin (2023) examined how incumbent firms can respond strategically to digital disruptive innovations with particular reference to two international hotel chains. To guide the direction

of the study, the researchers put forward two research questions (1) how can the hospitality industry be disrupted by digital innovation and (2) in what way can the industry respond to digital disruption. Primary data was obtained by means of interview and as well as physical and online observations from 2013 to 2022. Using descriptive analysis, the study found the hotel chains have implemented digital technologies in the form of apps to manage interactions. The study identified three types of responses that the hotel industry provides to cope with digital disruption which includes (1) responding to new digital innovations identified in the hospitality industry (2) Putting into action the strategies that were developed in response to the new innovation (3) Renegotiating what the hotel considers as good service and value creation for guests.

3. MATERIAL AND METHOD

Survey research design was adopted for the study. The population of the study comprises of all registered students and academic staff at Nnamdi Azikiwe University, Awka. Data was obtained from questionnaire administered on-line through the school whatsApp. A five points likert scale was used to obtain data from respondents in such a way that respondent indicate in the questionnaire the extent to which he is satisfied or dissatisfied to each statement put before them by the researcher. Weights were assigned to each point in the scale as shown below.

Highly Satisfied (HS) = 5 points
Satisfied (S) = 4 points
Undecided (U) = 3 points
Dissatisfied (D) = 2 points
Highly Dissatisfied (HD) = 1 point

Data collected for the research work is shown in appendix 1 and 2 while the mean score for analysis is presented in tables 1 and 2 below. Researchers adopted one sample T-test to test hypotheses of the study. Application of one sample T-test is appropriate when the desire of the researcher is to compare the mean score found in an observed sample to some hypothetical value.

The one sample T-test is considered appropriate for this study because researchers wish to determine whether the mean of the sample (responses) differ significantly from the hypothesized mean of 3 that represents the population mean. A mean score

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of 3 and above is considered to be an acceptable mean score while a mean score of any other number below 3 is considered unacceptable mean score and therefore rejected.

3.1 Decision Rule

The rule is to accept the null hypothesis and reject the alternative hypothesis if p-value from the test statistics is greater than 0.05 at 95% degree of freedom.

4. RESULT AND DISCUSSIONS

4.1 Data Analysis

Table 1: Mean response on digital innovation and student affairs activities

Question	Mean Response
1	3.33
2	3.39
3	3.04
4	3.49
5	3.96

Author's extraction from appendix 1

Table 2: Mean response on digital innovation and staff & management activities

Question	Mean Response
1	4.00
2	3.63
3	3.86
4	3.36
5	3.84

Author's extraction from appendix 2

4.2 Test of Hypotheses

4.2.1 Hypothesis One

H_o: Digital innovation has no significant effect on the performance of tertiary institutions as it relates to student affairs activities

The above hypothesis was tested using the mean score as shown in appendix 1

Table 3: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
SAA	5	3.4420	.33447	.14958

Author's computation with the aid of SPSS version 23

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Table 4: One-Sample Test

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
SAA	23.011	4	.000	3.44200	3.0267	3.8573

Author's computation with the aid of SPSS version 23

From Table 3 above, a mean score of 3.4420 was obtained which is more than the predetermined mean of 3. This position is further strengthened by a p-value of .000 as obtained from the test table above which is less than 0.05. Based on this position, we reject the null hypothesis and accept the alternative hypothesis which states that digital innovation has significant effect on the performance of tertiary institution as it relates to student affairs activities

4.1.2 Hypothesis Two

Technological innovation has no significant effect on the performance of tertiary institutions with reference to staff, teaching and learning activities of the university

Hypothesis two was tested using mean score as shown in appendix 2

Table 5: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
STLA	5	3.7380	.24924	.11146

Author's computation with the aid of SPSS version 23

Table 6: One-Sample Test

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
STLA	33.536	4	.000	3.73800	3.4285	4.0475

Author's computation with the aid of SPSS version 23

An acceptable mean of 3.7380 which is more than the hypothesized mean of 3.00 is obtained from the statistics table. This is further strengthened by a p-value of .000 as obtained from the test table above. A p-value of less than 0.05 implies the rejection of the null hypothesis. Based on this position, we reject the null hypothesis and accept the alternative hypothesis which

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states that digital innovation has significant effect on the performance of tertiary institution as it relates to staff, teaching and learning activities

Table 7: Summary of Results

Null Hypothesis	1	2
Hypothesis Statement	Digital Innovation has no significant effect on performance of tertiary institutions with regards to student affair activities	Technological innovation has no significant effect on performance of tertiary institutions with reference to staff, teaching and learning activities
Sample mean	3.4420	3.7380
Hypothesized mean	3.0000	3.0000
p-value	0,0000	0.0000
Decision on null hypothesis	Reject	Reject

CONCLUSION AND RECOMMENDATIONS

The revelation from our empirical analysis above, showed that:

Students at Nnamdi Azikiwe University are satisfied with the student affairs activities now digitalized by the university. Nnamdi Azikiwe University staff are satisfied with the virtual means of conducting staff related matters as well as teaching and learning activities

Based on the revelations above, the study concluded that digital technologies have significant positive effect on performance of tertiary institutions in Nigeria. This is in line with Rowsell (2004) who maintained that with digital technology one can become a better teacher and a more reflective learner. The study revealed that both the students and staff of the university are satisfied with the introduction of the online means in the conduct of various activities in the university.

Having empirically established that digital technologies have significantly improve the university various activities such as students affairs, staff matters and teaching and learning activities, the study recommends that other universities that are yet to remodel and digitalize their various activities should do so in order to improve on their performances.

1. To effectively consolidate on the gains of digital innovations in the university landscape, it is highly recommended that regular training of academic staff be organized so as to enable them improve on their skills and even learn new ones, especially in the area of IT, statistics, and modeling. This is in tandem with Assink (2006) who identified

inability to unlearn obsolete mental models as one of the factors inhibiting some incumbent firms from being proactive in developing disruptive innovations.

2. This study has empirically revealed that digital innovation has significant effect on educational activities but did not go further to test the type of effect digital innovation is having on educational activities. We therefore recommend that further studies be conducted to determine the type of effect digital innovation is having on university performance that is, whether the effect is a disruptive one or sustaining effect.

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APPENDIX I

Mean scores to determine the effect of digital innovation on student affairs activities

S/N	STATEMENT	SA [5]	A [4]	U [3]	D [2]	SD [1]	Total	No. of Respondent	Mean Score
1	Indicate your level of satisfaction with respect to online student enrolment thereby eliminating the need for physical presence on the school campus	33(165)	135(540)	80(240)	59(118)	18(18)	1081	325	3.33
2	Indicate your level of satisfaction with course registration now done online which differs from the conventional means that requires a lot of paper works	111(555)	142(568)	29(87)	36(72)	7(7)	1289	325	3.97
3	Indicate your level of satisfaction with regards to online lectures which has removed the need for physical presence in the classroom	44(220)	84(336)	66(198)	102(204)	29(29)	987	325	3.04
4	Indicate your level of satisfaction with regards to virtual means of project defense thereby eliminating the need to stand before a panel to defend your thesis	59(295)	126(504)	74(222)	48(96)	18(18)	1135	325	3.49
5	Examination result are now accessed online as soon s approved, kindly indicate your level of satisfaction in this regard	124(620)	118(472)	37(111)	37(74)	9(9)	1286	325	3.96

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APPENDIX 2

Mean scores to determine the effect of digital innovation on staff and teaching and learning activities

S/N	STATEMENT	SA [5]	A [4]	U [3]	D [2]	SD [1]	Total	No. of Respondent	Mean Score
6	What is your level of satisfaction with regards to staff documentations now done online as against the conventional manual way	47(235)	107(428)	25(75)	11(22)	0(0)	760	190	4.00
7	What is your level of satisfaction with regards to staff and other committee meetings being held virtually different from the conventional physical meetings	25(125)	99(396)	36(108)	30(60)	0(0)	689	190	3.63
8	Indicate your level of satisfaction with regards to staff annual appraisal which is now digitalized leaving out the conventional manual approach	41(205)	99(396)	33(99)	17(34)	0(0)	734	190	3.86
9	Indicate your level of satisfaction with regards to the online means of lecture delivery being adopted by some faculties in the university	22(110)	83(332)	37(111)	37(74)	11(11)	638	190	3.36
10	Kindly indicate your level of satisfaction with respect to virtual conduct of conferences, seminars and workshops by the university	46(230)	84(336)	44(132)	16(32)	0(0)	730	190	3.84

Source: Author's Questionnaire

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APPENDIX 3

Appendix 3a

Analysis of response by gender

GENDER	MALE	FEMAL	TOTAL
PERCENTAGE RESPONSE	41.70%	58.30%	100.00%

Appendix 3b

Analysis of response by Category

CATEGORY OF RESPONDENT	STUDENT	ACADEMIC STAFF	TOTAL
PERCENTAGE RESPONSE	63.10%	36.90%	100.00%

Appendix 3c

Analysis of student response according to level

STUDENT LEVEL	**100 level**	**200 level**	**300 level**	**400 level**	**Other level**	**TOTAL**
PERCENTAGE RESPONSE	7%	26.80%	29.70%	32.40%	4%	100%

Appendix 3d

Analysis of academic staff response according by rank

STAFF RANK	**Assitant lecturer**	**Lecturer ii**	**Lecturer i**	**Senior Lecturer**	**Reader**	**Professor**	**TOTAL**
PERCENTAGE RESPONSE	12.50%	32.50%	15%	20%	7.50%	12.50%	100.00%