MULTIMEDIA TECHNOLOGY APPLICATION TO INFORMATION SERVICE IN SELECTED UNIVERSITY LIBRARIES IN THE NORTHERN STATES OF NIGERIA

BY

IKWE, JOHN ADOGA BLS (ABU 2006)
P13EDLS8190

A THESIS SUBMITED TO THE POST GRADUATE SCHOOL, AHMADU BELLO UNIVERSITY ZARIA NIGERIA

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE IN INFORMATION SCIENCE

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE
AHMADU BELLO UNIVERSITY, ZARIA
NIGERIA

JUNE, 2015

DECLARATION

I hereby declare that this thesis entitled "Multimedia Technology Application to Information Service Delivery in University Libraries in Northern States of Nigeria" had been written by me under the supervision of Professor Zakari Mohammed and Dr Ezra .Gbaje. All literature consulted and cited were properly acknowledged.

Ikwe, John Adoga ---------- ----------
Signature Date

DEDICATION

This research work is dedicated to my father- Ikwe Egboja (late), Mother- Ohie Ikwe Egboja (late), and also to the memories of my late brothers Chief Mathew Ominyi Ikwe and Jeremiah Ogbudu Ikwe. My living brother Elder Job Alom Ikwe and sisters also share in this dedication. And to my little kids Judith Ohie Ikwe and Jamima Adiya Ikwe including their mother Charity Audi-Ikwe who always wanted me to “hustle up and finish this thing like others.”

CERTIFICATION

This is to certify that this thesis entitled "Multimedia Technology Application to Information Service in Selected University Libraries in Northern States of Nigeria" had met the requirement for the award of Master's Degree of Library and Information Science of Ahmadu Bello University, Zaria-Nigeria.

---------- ----------
Prof. Zakari Mohammed Date
Chairman Supervisory Committee

---------- ----------
Dr Ezra Gbaje Date
Member Supervisory Committee

---------- ----------
DR Abdullahi Musa Date
Head of Department

---------- ----------
Professor Zoaka Hassan Date
Dean Postgraduate School

ACKNOWLEDGEMENT

First and foremost I wish to express my gratitude to God Almighty who gave me the opportunity and understanding to successfully undertake this programme and to bring it to a successful end. My sincere gratitude and appreciation go to my supervisors Professors Zakari Mohammed and Dr Ezra Gbaje for their encouragement, constructive criticism, understanding and patience throughout the period of the programme. Many times they tried to bring me back on track when I got lost in entirely unwarranted circumstances. .

My sincere gratitude also go to my lecturers Dr Abdullahi Musa, Dr Baba Aduku, late Dr Ahmed Lemu, Dr Abu Yusufu, Dr. (Mrs.) H. M. Daudu, M. M. Hayatu, Mrs. Mohammed, Mallam Idris, Mallam Jibril for their support, contribution and encouragement towards the successful completion of this study. I am also grateful to my colleagues at Kashim Ibrahim Library, Ahmadu Bello University for all their support. Worthy of mention is Mr. John Aruya for his untiring persistence towards seeing that I finished the work. Mrs Ndakotsu Carol, Mrs. Onadiran, Aliyu Abdulkadir, Habibu Mohammed, Aminu Shehu Liman, Chichi and the Saadatus among others deserve mentioning for their valuable moral support. My family deserves commendation here too. I appreciate my children Judith and Jamimah and their mother for all their support. To my late brothers and late parents I say *thank you* though you are not alive to see how sons of men took it upon themselves to help one of your own.

ABSTRACT

This study was carried out to investigate Multimedia Technology Application to Information Service Delivery in the university libraries in the Northern states of Nigeria. Five research questions and 3 hypotheses were formulated and tested with respect to the types of multimedia technology application available and used; types of information services provided using multimedia technology applications and effect of multimedia technology on information service delivery in the university libraries in the northern states of Nigeria. Survey research design was used for this study. A total of four hundred and seven(407) librarians from ten (10) target university libraries were drawn as the population while the sampled number was eighty one(81) from six selected libraries. The six selected university libraries were those of Abubakar Tafawa Balewa University Bauchi, Ahmadu Bello University, Zaria; Bayero University, Kano, Federal University of Technology, Minna, University of Jos and University of Maiduguri respectively. Questionnaire was used to collect data for this study. The data collected were presented and analyzed using frequency distribution tables and percentages .Chi Square ($x^{\dagger}2$) procedure was used to test hypothesis three while hypothesis one and two were tested with Pearson Product Moment correlation procedure. The null hypothesis that multimedia technologies available and used in the university libraries in the northern states in Nigeria had no significant effect on information service was rejected as the observed significant level was 0.000($P<0.05$) The research discovered that there are different types of multimedia technologies applied for information services in the university libraries. These include text, audio, video, sound recordings and animations along with their streaming mode of presentation either live or stored audio and video; and that the application of multimedia technologies available in the university libraries has significant effect on information service delivery. The findings indicated that none of the libraries studied applied live interactive audio and live interactive video for information service delivery. The research recommends that a periodic in-house training for all library staff on the application of multimedia technologies be the starting point for their deployment. It also recommends acquisition of up-to-date hardware and software that are necessary for effective application of multimedia technologies to information service delivery.

TABLE OF CONTENTS

Title Page - - - - - - - - - i

Declaration - - - - - - - - - ii

Dedication - - - - - - - - - iii

Certification - - - - - - - - - iv

Acknowledgement - - - - - - - - - v

Abstract- - - - - - - - - - vi

Table of Content - - - - - - - - - vii

List of Tables - - - - - - - - - xi

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study - - - - - - 1

1.1.1 University Libraries in Nigeria - - - - - - - 3

1.1.2 Relevance of Multimedia to Information service Delivery- - - 4

1.2 Statement of the Problem - - - - - - 7

1.3 Research Questions - - - - - - - 8

1.4 Objectives of the Study - - - - - - 9

1.5 Research Hypotheses - - - - - - - 9

1.6 Significance of the Study - - - - - - 10

1.7 Scope of the Study - - - - - - 10

1.8 Limitation of the Study - - - - - - 11

1.9 Operational Definition of Terms - - - - - 12

References - - - - - - - - 13

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Introduction - - - - - - - - 16

2.2. Types of Multimedia Technology Applied to Information Service Delivery-16

2.2.1 Multimedia Communication Model - - - - - 18

2.2.2 Multimedia Over Wireless Networks - - - - - 19

2.2.3 Backing storage for Multimedia Technology Applications - - 20

2.3. Types of Information Services Delivered Using multimedia Technologies. 21

2.3.1 Media Service - - - - - - - 23

2.3.2. Reference Services - - - - - - 24

2.3.3 Customer Service - - - - - - 24

2.3.4 Current Awareness Services - - - - - - 25

2.4 How Multimedia Technology is Applied to Information Service Delivery in university libraries. - - - - - 26

2.5. Effects of Multimedia Technology Application to information service delivery in academic libraries. - - - - 28

2.6 Limitations of multimedia technology application to Information

Service Delivery in University Libraries - - - - -29

2.6.1 Technology - - - - - - - - 29

2.6.2 Skilled Manpower - - - - - - - 30

2.7 Summary of the Review - - - - - - 31

References - - - - - - - - 32

CHAPTER THREE: METHODOLOGY

3.1. Introduction- - - - - - - - - 37

3.2. Research Method Adopted - - - - - 37

3.3. Population of the Study - - - - - - 37

3.4 Sample, Sample Size and Sampling Procedure - - - 38

3.5 Instruments for Data Collection - - - - - 39

3.5.1. Observation - - - - -- - - - 40

3.6 Pilot Study - - - - - - - - 41

3.7 Validity and Reliability of Research Instrument - - - 41

3.8 Procedure for Data Collection - - - - - 41

3.9 Method of Data Analysis - - - - - - 42

References - - - - - - - - 43

CHAPTER FOUR: DATA PRESENTATION AND ANALYSIS

4.1. Introduction - - - - - - - - 44

4.2 Response Rate - - - - - - - - 44

4.3. Descriptive analysis of the socio-demographic characteristics - 46

4.3.1 Classification of the respondents by their respective departments in the libraries - - - - -- - - 46

4.3:2 Classifications of the respondents by their gender in the libraries - 47

4.3.3: Classifications of the respondents by their years of working experience 48

4.3.4: Distribution of the respondents by their academic qualifications - 50

4.3.5. Types of Multimedia Technology Applications available in university Libraries - - - - -- - - - 52

4.3.6. Use of multimedia technology for information service delivery in the University libraries in Northern states of Nigeria - - 54

4.3.7 How multimedia technology applications is applied to Information Service Delivery by the University Libraries - - - - 56

4.3.8. Types of information services provided using the multimedia technology application in the University libraries in the Northern States of Nigeria - 58

4.3.9 Effects of multimedia technology applications to information service delivery in the University libraries in the Northern States of Nigeria.- 60

4.3.10 Problems militating against multimedia technology applications to Information. Service Delivery in University Libraries in the Northern States of Nigeria - - - - - - - 65

4.4 Test of Hypotheses - - - - - - - 68

References- - - - - - - - - - **72**

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction - - - - - - - - 73

5.2 Summary of the Study - - - - - - 73

5.3. Summary of Major Findings - - - - - - 74

5.4. Conclusion - - - - - - - - 75

5.5. Recommendations - - - - - - - 76

5.6 Suggestions for Further Studies - - - - - 76

BIBLIOGRAPHY - - - - - - - 77

LIST OF TABLES

Table 3.1 Professional Librarians of the population under study - 38

Table 3.2: Sample Distribution Across Institutions - - - 39

Table 4.1 Response rate used for the study - - - - 45

Table 4.2 Classification of Respondents by Departments - - 46

Table 4.3 Classifications of the respondents by their gender in the libraries - - - - - - - 48

Table 4.4 Years of Experience - - - - - - 49

Table 4.5 Academic Qualification - - - - - 51

Table 4.6 Types of multimedia technology available for information services in university libraries - - - - 53

Table 4.7 Types of multimedia technologies used for Information Service Delivery by the University Libraries - - - 55

Table 4.8 Use of Multimedia For Information Service - - - 57

Table 4.9 Types of information services provided using multimedia technologies - - - - - - - 59

Table 4.10a Effects of Multimedia Use - - - - - 62

Table 4.10b Effects of Multimedia Use - - - - - 63

Table 4.11 Factors Inhibiting the Use of Multimedia Technologies for Information Service Delivery in the University Libraries- - 66

Table 4.12 Correlation Between Multimedia Use and Effectiveness of Service Delivery in the University Libraries- - - - 68

Table 4.13 Correlation Between Application of Multimedia Technologies and Satisfaction with Information Service Delivery of the University Libraries - - - - - - 69

Table 4.14 Mean Scores of the Libraries on the Adequacy of Multimedia Technology Applications to Information Service Delivery - - - - - - - 70

Table 4.15: Chi-square Test on Problems Militating Against the Application of Multimedia Technology For the Information Service Delivery of the Libraries - - - - - - - 71

APPENDIX

Questionnaire For Professional Library Staff- - - - - 84

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The traditional library consists of information resources in printed form. Its task has been to collect, process, store and disseminate information for the purpose of reading, teaching and consultation. The information, largely in print form, has been the most widely accepted format for providing information and library services to satisfy the needs of library customers, (Lvhua 2011). Today this is being complemented by electronic or digital resources that meet the needs of researchers and information seekers. Thus, at a time of ever increasing demand for information, libraries must keep abreast of developments in information technology and advanced communication to enable them provide services that today's society both expects and needs. Dahl et al (2006) posited that libraries that cling to traditional service models in an era of new information technology, rising costs and flat budgets cannot thrive.

During the 1980s computer specialists succeeded in integrating the text, graphics, animation, audio and video information after converting them into digital media (homogeneous media) called multimedia for publicity purposes. Since then, multimedia technology applications are permeating the educational system as a tool for effective teaching, learning and research. With multimedia, the communication of information can be done in a more effective manner. Mayer (2005), Ramaiah (2008) and Oshinaike & Adekumisi(2012), identified a common feature of multimedia technology which they observed to be a combination of various digital media types such as text, images, audio and video resulting into an integrated multi-sensory interactive application or presentation to convey a message or information to an audience. Mitchell (2014) defined multimedia technology as a rapidly developing technology

that permits customers to combine digital images, video, graphics, animation, and audio. Multimedia technology is also defined as the combination of various digital media types such as text, images, sound and video, into an integrated multi-sensory interactive application or presentation to convey a message or information to an audience. Bodnar and Fones (2009) defined Multimedia technology as the field concerned with the computer controlled integration of text, graphics, drawings, still and moving images(video), animation, audio and any other media where every type of information can be represented, stored and transmitted digitally. Multimedia technology also includes both hardware systems and software programs used to develop and run these systems. It also encompasses interactive computer based applications that allow people to communicate ideas and information with digital elements.

Generally, multimedia systems are being used for many purposes by different people in different organizations, offices, and environment. The main functions include media integration, storing, organization and dissemination of information at different places in different ways. Zhuang (2005) defined multimedia technology application as an application which uses a collection of multiple media sources eg text, graphics, image, sound/audio, animation and/or video. Multimedia technology applications mean the various ways in which the finished formats of multimedia elements can be delivered. Cheung and Rao (2003) expounds the several modes of multimedia technology applications to include streaming stored audio and video, streaming live audio and video, real time interactive audio and video, , interactive TV, download-and-play applications and those embedded digital objects within web pages talking books, etc. The computer, according to him is the biggest conduit for multimedia applications because multimedia content is always delivered electronically or digitally (Jumping et. al. 2008). Most of the libraries are using multimedia resources for reference service and instructional purpose as

well as in training using tutorial packages. For instance, multimedia tutorials are available on how to do online searching, how to use Boolean operators, how to decipher bibliographic citations as well as guide for performing a virtual tour for electronic library (VIKO 2012). Cell phones now have many features as the computer so they provide multimedia applications as well.

Multimedia technology not only helps the customers in providing information from different media (print, microforms, audio and video) on one platform (integrated), but also saves space, money, maintenance, operational inconveniences, etc. The other advantages of multimedia applications in libraries include helping satisfying different information needs such as reference, enrichment, entertainment, leisure, etc.; meeting various types of information preferences of the users, such as scholarly, scientific, vocational, artistic, recreational, etc. Being in digital format, information can also be accessed by remote users on a network. It also helps in overcoming the barriers of boundaries, proximity and physical capacity of a library to accommodate customers. It is interesting and easy to use over the existing form such as print, microforms, and other analogue formats. Similarly its control and interactivity helps the customers elicits positive attitudes towards the application.

1.1.1 University libraries in Nigeria

All Universities in Nigeria have academic libraries. As at 2014, there are about a hundred and fifty (150) universities in Nigeria (Top 100 Universities in Nigeria and Their Ranking, 2014, and Joint Admission and Matriculation Board, JAMB, 2014). Nigeria's university system is been supervised by the National Universities Commission (NUC), a parastatal under the Federal Ministry of Education Agoulu (2002) defined a university library as a place in which literary and artistic materials, such as books, periodicals,, pamphlets, prints records are kept for reading,

reference or lending. University libraries (also called Academic Libraries) are libraries attached to Universities to disseminate information and store information for its users. Akporhonor(2005) and Singh and Kaur (2009) stressed that preservation and access to knowledge and information is the main mandate of university libraries alongside supporting the mission of their parent institutions which is teaching, research, learning and community services. University libraries are at the forefront of providing information services to their respective communities which comprised students, lecturers, researchers and administrators in order to support their teaching, learning, research, and administrative needs.

With the advent of Information and Communication Technologies (ICTs), the role and position of libraries has dramatically changed. Agbalogun (2013) observed that the rapid pace of development in the field of information technology and the advent of networked information services have prompted a comprehensive review of the Library and Information Science (LIS) profession. This is supported by the views of Mohammed (2003) who posited that "the world is continuously revolving around societal dialectics usually manifested in form of continuous changing needs of all and sundry irrespective of their socio-economic and political divide to achieve their collective and individual objectives, goals and mission…" Today, the contemporary practice in university library services in the 21st century is being propelled with an information explosion, and the inclusion of Information and Communication Technologies (ICTs) in all aspects of library services (Kumar, 2009).

1.1.2 Relevance of Multimedia Applications to Information Service Delivery

Information services are considered to be a sine-qua-non for the proper orientation and guidance of every society. The level of sophistication of any society and the nature of its development are largely determined by the availability of information channels-.Multimedia

technologies can be used for information service delivery through computer based training materials such as PowerPoint presentations, web-based training materials such as tutorials, audio and video collections (Mayer et.al. 2002, Ali, 2013). Information services that can be provided using multimedia technologies include web based services like media services reference and information services, current awareness services, customer relation services, etc (Ogunbote &Adesoye(2006), Kanamadi &Kumbar, (2006), and Rao & Coughury (2010) These are what must be employed for effective transfer and diffusion of information and knowledge which is to be rapidly utilized for differing needs and purposes. Omagbemi et.al.,(2004), supporting this view expressed that access to multimedia information could stimulate changes and creates conductive learning environment and make learning more meaningful and responsive to the localized and specific needs of learners University libraries exist to promote knowledge and application of scientific information in direct support of an activity towards fulfilling the mission of an organization/institution (Aina & Adekanye 2013) . Information is organized to meet specific requirements using conventional or technically oriented information systems. It is line with this that Woodsworth and Williams II (1993) defined an information service as a set of activities that provide individuals with relatively easy access to data or information. Information services refer to activities carried out to satisfy the intended customers. Quality service package delivery is a formidable task for all institutions (Gupta, 2003).Mulla and Chandrashekera (2005) studied how digital information provisions have boosted a fundamental change in library and information services. The main advantage of a digital format is the flexibility in combining, transmitting, manipulating and customizing the elements of the multimedia according to the needs of the customer. Basically, a multimedia system will have a powerful PC with high-end graphics processor, a sound card (to play and record sound), CD drive, and multimedia extensions and drivers for playing digital audio and video (Ramaiah, 2008).

Information service delivery is concerned with producing and disseminating data, products and services that are fit for a purpose and relevant to customer needs. Umar (2010) defined information service delivery as the act of providing various information products and services to the right customer in the right place at the right time and in the appropriate channel and format that will satisfy the customers' need. Training manuals, tutorials, documentaries, feature films and/or video on demand, can (either through audio or video streaming) be delivered to customers with a view to providing relevant information concerning their needs. Typical types of services that can be delivered in libraries using multimedia application as observed by Chauhan (2004) include : reference services which can use store and forward multimedia mail, as well as utilizing programs like chats and Ask-the-librarian.link, Current awareness bulletins using predefined search strategy and running on the database either on CDROM or online periodically and getting the desired output, can be provided as information service in university libraries, Similarly, in customer relations, information literacy and/or user education, conventional user education programmes can be supplemented with web based instructions and guides for use of resources through multimedia based presentations and demonstrations (Gerolimos and Konsta, 2009).

University libraries are expected to perform information services' delivery to intended customers through use of varied media of communication. Most academic libraries deliver information services to customers through conventional print-based media. It is important to stress that because of the dynamics of growth of knowledge and information, university libraries are expected to provide both manual and automated/online information services in order to meet the ever growing needs of their customers.

The power of multimedia technology application in the provision of information services lies in the fact that it is multi-sensory, stimulating the many senses of the audience. It is interactive, enabling the end users of the application to control the content and flow of information. It can also help meet information preferences of the users scholarly, scientifically, vocationally, artistically, recreationally etc.

1.2 Statement of the Problem

The objectives of a university library are to become relevant in information service delivery and to provide optimum level of service satisfaction to potential customers. In carrying out such objectives, the idea of providing multimedia system for information service delivery will have a far reaching audience than any form of traditional delivery sytem because of the creative and effective way of communicating information, (Ali 2013).

According to Aina and Adekanye (2013), the rich variety of multimedia expressions in society should be reflected in the services offered to customers by the libraries. The traditional information service options seem to be no longer acceptable to a larger majority of the customers (IFLA 2004). Lvhua (2011) observed that presently there is a strong demand for newer forms of services such as multimedia based which has now become a vital part of our cultural heritage. Libraries have throughout the history ensured a democratic, independent and free access to the knowledge and intellectual value represented by conventional books. It is evident that this principle is also valid for multimedia information (IFLA 2004). Thus availability of multimedia information through data networks may also open completely new ways for university libraries to obtain information for their customers (Gupta,1996),(Martey et. al. 2004), (Ubogu,2006).and Unagha 2009.

It has been observed that an ever-increasing amount of information – covering educational and recreational interests as well as information needs – is being produced in a wide range of multimedia technologies and electronic formats. Application of multimedia technology in libraries will attract new customers who at present see it as an out of date public service that provides "just books." It is within this context that it is apt to study multimedia technology application to information services in the university libraries.

1.3 Research questions

The study attempted to answer the following questions.

1. Are multimedia technologies available for information service in university libraries in northern states of Nigeria?
2 What type of multimedia technologies are available for information service delivery in the university libraries in Northern states of Nigeria?
3 What type of multimedia technologies are used for information service delivery in the University libraries in Northern states of Nigeria?
4 What type of information services do librarians provide using the multimedia technologies in university libraries in Northern states of Nigeria?
5. What are the effects of multimedia technology applications on information service delivery in the university libraries in the Northern states of Nigeria?
6. What are the challenges to multimedia technology applications in information service delivery in the University libraries in Northern states of Nigeria?

1.4 Objectives of the Study

Specifically, the objectives of this study are:

1. To determine whether multimedia technologies are available for information service delivery in university libraries in northern states of Nigeria.
2. To determine the type of multimedia technologies available for information services delivery in the university libraries in Northern states of Nigeria.
3 To determine the type of multimedia technologies used for information services delivery in the University libraries in Northern states of Nigeria.
4. To determine the type of information services that librarians provide using multimedia technologies in the University libraries in the Northern States of Nigeria.
5 To determine the effect of multimedia technology applications on information service delivery in the University libraries in the Northern States of Nigeria.
6. To examine the challenges to multimedia application to information service delivery in the University libraries in the Northern states of Nigeria.

1.5 Hypothesis

The research tested the following hypotheses:

Ho1 The Multimedia technologies available and are being used in the university libraries in the Northern States of Nigeria have no significant effect on information service delivery.

Ho2. The multimedia technologies used for information service delivery in the university libraries in the Northern States in Nigeria have no significant effect on the library customers' satisfaction with the information services provided.

Ho3 There is no significant difference among the Universities libraries in Northern states of Nigeria in the challenges to multimedia technology applications in information service.

1.6 Significance of the study

The findings of this research would be of great importance to university libraries under study following ways :

- It will assist the university library management to provide adequate multimedia facilities in their respective libraries.
- It will encourage staff and customers to use multimedia applications in such a way as to stimulate their interests.
- It will bridge the information provision gap between those of multimodal type and otherwise.
- It will increase the quality of education generally

Also, the study is important because like every research work, it would seek to add to the existing body of knowledge by providing relevant literature for researchers who may want to carry out related studies and will also show data from the perspectives of information service providers to their customers.

1.7 Scope of the Study

This study covered only six (6) selected university libraries in Northern States of Nigeria. These University libraries were: Abubakar Tafawa Balewa University Bauchi library; Kashim Ibrahim Library, Ahmadu Bello University, Zaria; Bayero University Library, Bayero

University, Kano; Federal University of Technology Minna's Library; University of Jos library and University of Maiduguri library.

However, the library staff who were the subject of the study comprised librarians from the selected University libraries that were in the departments where multimedia-based information services are being provided.

1.8 THE LIMITATION OF THE STUDY

In this research, a lot of constraints has been identified which will definitely hinder the full implementation of the study. This included the following

- Reluctance on the part of some respondents to offer useful information required of them.,
- Inaccessibility to other relevant data
- Risk involved in going round some violent prone areas for data collection, Hence the choice of selected university libraries within the study area.
- Shortage of funds required to tour the study areas.
- Delay caused by respondents in filling the questionnaire. Thus, a lot of questionnaires were not returned back for collection to research assistants concerned. Nevertheless, the researcher was able to compose and collect the relevant information for this study.

1.9 Operational Definition of Terms

The explanations of some terms used in this research are as follows:

Application – The use something is put to or the process of putting it to use for a particular purpose.

Information and Communication Technology– This embraces computers, telecommunications, and software systems that aid the organization, transmission, storage and utilization of information

Information Service- Any activity undertaken with view to producing and providing of information

Information Service Delivery. :It is the act of providing various information products and services to the right customer in the right place at the right time and in the appropriate channel and format that will satisfy the customers' need.

University Library: This simply refers to the type of library established in the University to promote, encourage and support research, scholarship and academic excellence.

REFERENCES

Adekanye, E.A. (2011) Marketing of Information Resources in Selected Public Libraries in Lagos State: A Competitive Intelligence Approach. International Journal of Information Technology 89(1):49-59.

Aina, A.J & Adekanye E.A (2013) Audio-visual resources availability and use for library services aamong colleges of education in Lagos State Nigeria *International Journal of Library and Information Science* 5(10).

Agbalogun, A.(2013). Interactive digital technologies' use in Southwest Nigerian universities. *Educational Technology Research and Development,* 61I(2) pp 333-357

Agoulu C.C. and Agoulu I.E.(2002). " User Education in Nigerian Academic Library Libraries" *Libraries and Information Management in Nigeria. ED-LINFORM Services, Maiduguri,* p382

Akporhonor, B.A.(2005). Library Funding in Nigeria : Past, Present and Future. *The bottom Line: Managing Library Finances*, 18(2): 63-70

Ali, Y.S.(2013). Design and Implementation of Multimedia Content on Smartphone for Learning Automata Theory. Unpublished Thesis submitted to African university of science and Technology, Abuja.

Bodnar, E. and Fones J (2009). *Library Collections 2.0: Managing Multimedia Technologies in Academic Libraries*. Presented at the Access Services Conference 2009, November 11 - 13, 2009, Georgia Institute of Technology, Georgia Tech Global Learning Center, Atlanta, Georgia

Chauhan, V(2004). Information Technology and Services .Retrieved on 12/3/2013 from http://vikaschauhan.brandyourself.com/

Cheng-chih W,& Kao, H (2008).Streaming Videos in Peer Assessment to Support Training Pre-service Teachers *Educational Technology & Society - ETS* , 11, (1): 45-55

Dahl M., et al (2006).*Digital libraries: Intergrating Content and System*.- London : Claude Publishing Ltd.

Fatoki, O.C. (2005). Prospects of GSM Technology for Academic Library Services.*The Electronic Library* 23(3); 266-273

Gerolomos, M and Konsta, R(2011). Services for Academic libraries in the new era.*D-lib Magazine* vol.17 (7/8)

Gupta, S. (1996).Impact of information technology on library management techniques and staffing structure. In: Human Relations in Librarianship. Seminar Papers of XLI All India Conference held on January 7-10, 1996 in Vijayawada, 1996, pp. 336-343.

Gupta, S. (2003).Emerging trends in commerce and management Education. *University News*, 41 (05), 3-8.

IFLA(2004). *Libraries: Tools For Education and Development.* Retrieved from http//archives.ifla.org/iv/ifla70/ on 16/4/2014

Jumping, S. et.al (2008) The Application of Multimedia in Academic Libraries. Proceedings of the International Conference on Multimedia and Information Technology held at Three Georges, China, 15th-18th September.

Kanamadi, S., &Kumbar, B.D. (2006). "Web-based services expected from libraries: A case study of management institutes in Mumbai city". *Webology,* 3 (2), Article 26.Accessedon 18/02/2014 at: http://www.webology.org/2006/v3n2/a26.html

Kumar, M. (2009).*Academic Libraries in electronic environment: Paradigm shift.* A paper presented at the International Conference on Academic Libraries (ICAL) held at the University of Delhi, India. P. 105

Luvhua, T.(2011). Multimedia Application Research in Sport Education. *Procedia Engineering, Elsevier Ltd Selection and peer-review under responsibility CEIS.*

Martey, K et al (2004) The Effectiveness of Multimedia for Library-User Education: Final Report of the LUMENS Project Accessed on 11/04/2014 from http://www-personal.si.umich.edu/~ylime/lumens/lumensFinal.pdfl.

Mayer R. *et. al. (*2002). Aids to Computer –based Multimedia. In Learning and Instruction 12:107-119

Mayer, R(2003) Multimedia Learning in an Interactive Self-Explaining Environment: What Works in the Design of Agent-Based Microworlds?95(4):pp808-816

Mayer, R(2005). *The Cambridge Handbook of Multimedia Learning.* New York: Cambridge University Press

Mitchell, (2014)VHS, DVDs, Streaming Videos, and Audiobooks. Retrieved on 7/8/2013 from http://libraryguides.mtsu.edu/content.php?pid=604809&sid=4990554

Mohammed, Z.(2003). Contemporary Trends and Status of Development in Library and Information Systems and Services in Nigeria. A paper Presented at the Workshop for Feasibility Study on Development of Virtual Library for Nigeria Held at the NTI Conference Centre, Kaduna, 23rd-25th August

Ng, K. H. and Komiya, R. (2000).*Introduction of Intelligent Interface to Virtual Learning Environment.* Paper presented at the Multimedia University International Symposium on Information and Communication Technologies 2000 (M2USIC'2000), October 5-6, Petaling Jaya, Malaysia.

Ogunbote, K.O. and Adesoye, A.E. (2006). Quality assurance in Nigerian academic libraries networked multimedia services. *Journal of Library and Information Science,* Vol. 3. No. 1 & 2 pp. 100-111.

Omagbemi, C.O., Akinola, B.A. and Olayiwola I.B. (2004). Academic libraries, the Internet and it's potential impact on teaching and learning in Nigerian tertiary institutions. *Journal of Library and Information Science,* Vol. 1 (1 & 2), pp. 34-46.

Oshinaike A.R. and Adekunmisi S.R.(2012) Use of Multimedia for Teaching in Nigerian University System: A Case Study of University of Ibadan. *Library Philosophy and Practice*

Singh, J. and Kaur, T. (2009). Future Academic Libraries in India: Challenges and opportunities. A Paper presented at the International conference on Academic libraries (ICAL) held in the University of New Delhi, India

Ramaiah, C.K.(2005). Multimedia Systems in Libraries and their Application.*DESIDOC18(6*

Rao,Y.S.andCoughury, B.K.(2010). Networked Services in the NIT Libraries in Zone wise .*Library Collections, Acquisitions & Technical Services*34

Top 100 Universities in Nigeria and their Ranking(2012). Retrieved from http://www.41cu.oeg/Africa.2013 on 10/09/2013.

Ubogu, F. N. (2006). Trends in digital library services in academic libraries in South Africa: library profiles and ETD system. Conference proceeding of the 44th Annual National Conference and AGM of Nigerian Library Association held at Abuja, Nigeria, pp. 18-23

Umar, L.(2010) Application OF Customer Relationship Management (CRM) in Information Service Delivery in University Libraries in North Western states of Nigeria. *An unpublished Thesis submitted to the Department of Library and Information Science, Ahmadu Bello University, Zaria*

Unagha, A..O. (2009). Nigerian University Libraries and Challenges of User Service Demand of the 21stCentury:What University Administrators Should Know. *South African Journal of Library and Information Science*, 75(2)

Viko Library Solution(2012). Libraries and Multimedia Technology: Future Trends and Applications in Higher Education. Retrieved on 26/12/13 from http://www.viko-security.com/libraries-and-multimedia-technologyfuture-trends-and-applications-in-higher-education/.

Woodsworth, A and Williams II, J.F.(1993). Managing the Economics of Owning, Leasing and contracting out Information Services: Vermont, Ashgate Publishing Limited. p5

Zhuang, Xin et. al (2001).Utilization of Multimedia Technology in GIS. Retrieved on 23/11/14 from www.ispr.org.proceedings/xxix/congress/part18...

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. Introduction

This chapter reviewed the literature that is thought to have particular relevance and applicability to the present study. Going by the objectives of the study, review was done with respect to the following:

2.2. Types of multimedia technologies available and used for information service delivery.

2.3. Types of Information services provided using multimedia technologies in University libraries.

2.4. Effects of Multimedia technology applications on information services.

2.5 How multimedia technology is applied to information service delivery

2.6. Factors that limit multimedia technology application in Information service delivery.

2.2 Types of Multimedia Technology Applied to Information Service Delivery

Multimedia technology has been variously defined. Newton and Rogers (2011) saw multimedia technology as a class of computer-driven interactive communication systems- which create, store, transmit, and retrieve textual, graphic, and auditory networks of information. Ogunlana (2012) defined multimedia technology as an information delivery system which provides a learning environment that is self-paced, learner-controlled, and individualized. Andrade, Mercado and Reynoso (2008) and Lvhua (2011) observed multimedia application to have made revolutions of educational theories as it improves the whole effect of information provision and then to exploit new delivery techniques. University libraries are thus expected to provide information resources with a variety of representation media in an integrated manner

such as are seen with multimedia technology applications. The main elements of the multimedia technology as presented by Brandenburg and Yu (2011) are:

Text: information about an object/ event, etc; notes, captions, subtitles, contents, indexes, dictionaries, and help facilities.

Data: tables, charts, graphs, spreadsheets, statistics, and raw data.

Graphics: both traditional and computer, generated (vector form) such as drawings, prints, maps, etc.

Photographic images: (raster form): negatives, slides, prints (both from digital still & video cameras and scanned photographs).

Animation: including both computers generated video, etc.

Audio: including speech and music digitized from cassettes, tapes, CDs, etc.

Video (digital): either converted from analogue film or entirely created within a computer.

According to Cheung (2003) a multimedia system records, processes, stores and delivers all types of information in binary code the same way as a computer does. This is quite different from the traditional analogue technology of radio, TV, A-V tapes, gramophone records, or the combination of digital audio and analogue video in interactive video discs, (Jumping *et al.*, 2008) The main advantage of a digital format is the flexibility in combining, transmitting, manipulating and customizing the elements of the multimedia according to the needs of the customer.

In a review by Panankamudi and Padma (2014) it was observed that the predominant multimedia collection of a university library comprises video resources, audio collection, computer based training materials (CBTs), Web based training materials(WBTs), illustrations, photograghs, etc. Depending on the nature of the parent institution's goals, academic focus, Similarly, applications in other areas such as medicine, travel, real estate, banking, insurance,

administration and publishing are emerging at a fast pace. These applications are all characterized by large multimedia documents that must be communicated within very short delays. Computer-controlled cooperative work, whereby a group of customers can jointly view, create, edit and discuss multimedia documents, is now characteristic of many transactions. Some glamorous applications on multimedia processing include: distance learning, virtual library access and living books. In distance learning, we learn and interact with instructors remotely over a broadband communication network. Virtual library access means that we instantly have access to all of the published material in the world, in its original form and format, and can browse, display, print and even modify the material instantaneously (Woodsworth and Williams II 2009). Living books supplement the written word and the associated pictures with animations and hyperlink access to supplementary material (Rosengerg, 2003, Bojkovic, 2006 and, Wolf 2007). Applications that are enabled or enhanced by video are often seen as the primary justification for the development of multimedia networks.

The strength of multimedia communications arises out its combination of penetrating theories with adaptation to the new technological realities of a diversity of programme delivery systems and the new economic realities of multimedia diversification. Research-thrust and above all resource allocation and financial capabilities, their collection strengths may considerably vary.

2.2.1 Multimedia Communication Model

There is no theoretical framework for this study because multimedia is still an emerging technology. Although research on verbal information processing has a long and fruitful history in psychology and education, corresponding research on multimedia learning is just beginning to flourish. Multimedia learning research and in general educational technology research has been

characterized by inconsistency until now, failing to draw explicit conclusions with relation to the impact that multimedia and technology have on the learning process or to provide a comprehensive framework of design principles at the micro-level for the optimal integration of multimedia elements within a multimedia learning system (Koumi, 2003). Over three decades of research have not managed to resolve the problem satisfactorily. The literature does not lack studies with statistically significant results in favor of multimedia use from which a collection of factors that influence effective multimedia design may be drawn (Najjar, 1998, 2001)

However, theoretical Foundations that described the theories of multimedia learning which have had the greatest impact on research were Sweller's cognitive load theory (CLT) (Chandler & Sweller, 1991 and Sweller, 1999); Mayer's cognitive theory of multimedia learning (CTML) , (Mayer, 1991, 2001); Schnotz's integrative model of text and picture comprehension.

Adaptation to the new technological changes of a diversity of program delivery systems and the new economic realities of multimedia diversification has led to the redundancy of these theories. Mayer himself acknowledged that "technology is advancing faster than the knowledge of how people learn from the technology," (Stemler 1997).

2.2.2 Multimedia Over Wireless Networks

The explosion of technological advancements and the success of the second-generation digital cellular systems (e.g., Global System for Mobile - GSM and Personal Digital Cellular - PDC) have established wireless communications an indispensable in modern life. In a related review by Bojkovic, Milovanovic and Samcovic (2011) it was observed that because of the low-cost and low-consumption characteristics of emerging wireless products targeted at low to medium bit rate services, these products are now playing an important role in wireless communications..

Reacting to the applicability of mobile phones to multimedia services in university libraries, Karim, Darus and Hussin (2012) citing Steenderen (2002) examined how in the era of improved mobile communication technologies, vast amount of changes are generated facilitating communication and transfer of information from business to business, from business to customers, from employers to employees etc., and in providing more value added services. The technologies have made communication and access to information very convenient and timely to the customer from the comfort of their homes and offices or from where ever they are while on the move with their phones or PDAs. Various applications can be observed from users which range from telephone conversations to simple text messaging (SMS) multimedia messaging services (MMS) and Internet access, depending on the capability of the mobile technology and the services rendered. These applications have been made possible through developments in mobile telephone technologies such as WAP, GPRS and 3G standards.

2.2.3 Backing storage for Multimedia Technology Applications

In order to store multimedia technology applications you need backing storage. There are a number of backing storage devices which are all parts of the hardware of a computer system. When discussing backing storage the term access is used. Tilley and Park (2005) asserted that random/direct access is when the storage device can go to a piece of data straight away wherever it is stored. On a computer system, according to Tilley and Park (2005) the hard disk is the main backing storage device. Modern hard-disk drives have a large storage capacity. This large storage capacity is ideal for multimedia technology applications /presentations as these usually have large storage requirements, especially if they contain high-quality sound and video files (Tilley and Park, 2005).

Obserhauser (2011) observed that only a small number of university libraries were actually applying the technology of transferring collections to optical disc and providing them in the new format. CDs are known as optical storage which means that they use lasers to store and read data. CDs can be removed from a computer and used in other computers easily, making them portable unlike a hard disk. CDs have direct access. Tilley and Park (2005) observed that **C**ompact **D**isk **R**ead **O**nly **M**emory (CD-ROM) CD-ROMs have a large storage capacity, making them ideal storage for multimedia presentations.

Modern web pages often have embedded multimedia elements and modern browsers have support for various multimedia formats. Breeding (2007) highlights the risk of confining the use of the web within the library context, when specific tools are promoted. He argues that before libraries move to the next generation of services, many will have to catch up with the previous generation (Breeding, 2006).

2.3 Types of Information Services Delivered Using multimedia Technologies.

Information services can be defined as a set of activities that provide individuals with relatively easy access to data or information. Woodsworth and Williams (2012) likened information services as a combination of information, technology and people with libraries as the most easily recognized information centers. One way to understand information services is to analyze their common ingredients which include information professionals, information resources, and delivery systems. Information services are thus considered to be a requisite for the proper orientation and guidance of every society. The level of sophistication of any society and the nature of its development are largely determined by the availability of information channels. These are what must be employed for effective transfer and diffusion of information and knowledge which is to be rapidly utilized for differing needs and purposes (Suleiman, 2006).

Technically, library services are to promote knowledge and application of scientific information in direct support of an activity towards fulfilling the mission of an organization/institution (Aina, 2008 and Ladu2010). On the application of multimedia in university libraries Abubakar (2012 proffered that digital facilities demand machine searching as they offer relatively mature set of tools of information service delivery in learning and research. In line with this, he cited Chaudhary (2008) who stressed that the proliferation of electronic catalogs, databases and dial-in access has shifted customer expectations and behaviour. Virtually, most users of information in the university libraries are seeing the benefit of the new electronic searching and prefer it to hard-copy searching. In some cases, information users suffer from the "digital divide syndrome" or "information anxiety/overload" where they are tired without being able to get to the information they need. Henrietta (2005) observed similar instances, saying that "the hugeness of the amount of electronic information available on the web, information users are generally overwhelmed. This is more in Nigeria where a good number of web users are unable to efficiently/effectively use it " However, Crawford as cited in Gerolimos and Konsta (2011), was among the first to criticize the notion behind multimedia in library and information services. The entire world system of information service providers is facing increased pressure to become more competitive in virtually every aspect of its delivery of services. More information is being created, stored and shared. And, more people are accessing the same information in locations, at different hours, in different formats, and for different purposes (Cotton, 2010). Complicating this environment of information implosion is the ever-increasing rate of technological evolution. New technologies have provided for more cost-effective, but not always complimentary, models of computing. In addition, budgets are down and service demands are up. To meet these

challenges, libraries need to find ways to make their information technology do more, and do it better, and do it for less.

In contrast however ALIA (2013) describing the state of information services in university libraries, suggested converting books and journal collections to digital formats in the form of multimedia applications such as are expected to open up more learning spaces for individual and group studies in the library. The present declining funding cuts and restructuring in university libraries also called for reducing the size of physical collections and transferring them to offsite storage. It is the recommendation of IFLA that customers in all departments of the library should be offered the same level of service for audiovisual and multimedia, that the library offers regarding printed materials. All library staff should have an understanding multimedia use complement the collections in order to give reliable and complete advice to the customer.

2.3.1 Media Services

Library Media Services supports access to and creation of audio/visual media as data and information. In the world of knowledge, media helps define our collective desire to experience subjects across the disciplines, especially those where seeing and hearing are the primary elements of understanding. The services are: general and research audiovisual collections, media-centric learning and teaching spaces, multimedia production facilities, and staff who will be continuously trained to assist users seeking to fully understand and use this multi-media world of information.

2.3.2 Reference Service

Virtual reference is reference service initiated electronically, often in real-time, where library customers employ computers or other Internet technology to communicate with reference staff, without being physically present. Communication channels used frequently in virtual reference include chat, videoconferencing, Voice over IP, co-browsing, e-mail, and instant messaging (ALA, 2004, Pace, 2004).

Thus asynchronous tools such as email, subject gateways, frequently asked questions (FAQs), and interactive tools like chat rooms, virtual reference desk, and ask-me are complementing the conventional means of post, phone or in-person reference enquiries (Chauhan, 2004). *Ask-a-Librarian* allows the customer to click on *ask-a-librarian* link to send a formatted enquiry to the reference librarian. The reference librarian either provides an answer, links to resources or link to a subject expert. Interactive tools now allow a reference interview online.

2.3.3. Customer Relations Services

Neuhold and Nienderee (2013) posited that services for supporting the community relations, for example, services that foster community formation and services for supporting the communication and collaboration between community members are provided by university libraries through (chat, discussion forum etc.). Reacting to this Ebiwolate (2010) asserted that it is through user education that librarians' work is made easy and students effort reduced He further stated that if the library is for use by all, then all must be able to use library tools to enable them have access to services. Chauhan (2004) pointed out that conventional user education programs can be supplemented with web based instructions and guides for use of resources through application of multimedia tools for presentation and demonstration.

2.3.4 Current Awareness Service

Current awareness can be seen as a way to receive automatic alerts about new articles in your specific research area It is defined as technology that helps you to organize and mediate the information that you need to conduct your research. (IFLA, 2010). Current Awareness Services has been important means for keeping the customers up to date in their areas of interest. A current awareness service may be as simple as copy of table of contents or a bulletin containing bibliographic records of articles selected from the current issues of journals and other material, and usually organized by subjects Links to multimedia formats of the publication are provided in mail messages (Chauhan, 2004) .Thus two of the most popular tools for creating and maintaining current awareness are email alerts and RSS feeds. Current awareness tools can be applied to a number of library databases, as well as other web content (Tilley & Park, 2005 and IFLA 2010).

Libraries now compile current awareness bulletins using predefined search strategy and running on the database either on CDROM or online periodically and getting the desired output. Subject to copyrights, the output can also be stored on a local system, and disseminated online (internet, intranet) and offline (print, CDROM,). Similarly, guides on how to use such information resources are often designed in multimedia packages for instructions and demonstrations.(Tilley & Park, 2005).Table of contents of most journals are available free from the publishers' sites. Some publishers even offer free email update of table of contents. A large number of electronic publishing sites or portals now offer current information via email to registered users. Internet has enabled a lot of innovations in contents, methods of production and distribution of current awareness products. Tools such as Listserv, Weblog, Webzines and e-newsletters are common. Listserv give the latest information, hot topics, ideas and opinions, a chance to discuss issues, a source of advice and assistance.

2.4 How Multimedia Technology is Applied to Information Service Delivery in university libraries

Multimedia best suits the human being's complex perception, communicating behaviors as well as the way of acting. Namely, it will not only provide communication capabilities and information sharing to people, irrespective of location and time, but also easy and immediate access to widely distributed information banks and information processing centers. Woodsworth and Williams II (2009) and Vox *et al.,* (2012) asserted that multimedia communication is often delivered through cable, satellite and videotex which all represent alternative means of providing information, education, and entertainment to the customer. Hence the customer may be compelled to turn towards the new media and away from the traditional printed publication towards these services. Jumping *et al.,* (2008) presented the multimedia application framework in academic libraries. Three application layers, library marketing, Library services and library resources were discussed. Seminars, workshops and training constitute the most significant ways through which multimedia application are used in the university libraries. Multimedia products today support blogging and social media communications such as Blip, flickr, youtube, slide share in which case the elements manifest in the form of video, photo films, slide show and/or slide cast delivered either through windows or movie maker. According to Andrade, macado & Reynoso (2008), many media companies and operators, educational institutions and enterprises can deliver live video to any device including smart phones and tablets, set-top-boxes and gaming consoles. Full featured live streaming is now offered as service in libraries today. Emily (2013) expounds the general modes of multimedia applications to include streaming stored audio and video in which the multimedia content has been pre-recorded and stored on a server and the customer may pause, rewind, forward etc. Streaming live audio and video is similar to traditional broadcast/radio but delivered on Internet. It is non-interactive where customers can only view,

listen and cannot pause or rewind but often combined with multicast. Real time interactive audio and video may include phone conversation and or video conferencing. Interactive TV, embedded digital objects within webpage are some application examples. Live clippings can allow customers to clip small segments of the live stream during the live broadcast

Streaming audio and videos are now part of the university libraries collections. One of the easiest ways to find a title is to use a keyword search in the Catalog. Enter a keyword with the words “streaming video” or "streaming audio". For example: nutrition “streaming video” Select a title from the list of search results, and there will be link on the page to start your video. With these method customers can download videos from the libraries online collection that may include a growing catalog of feature films, documentaries, video on demand on to mobile or desktop devices. Andrade, Macado and Reynoso (2008) declared that with easy-to-use-viewing experience viewers can watch videos and movies from the library whenever and wherever they want. Customers can browse the video selection on the library’s website, borrow title with a valid library card and stream on most mobile and desktop devices. All videos will automatically expire at the end of lending period.

Emily (2013) asserted that certain streaming titles are also embedded into the catalog record. For these titles, the sound recording or video can be played directly from the catalog through a link.. For titles with multiple chapters, you will have to click on the chapter links at the bottom to load that section of the item. For example:

physical examination streaming video

anxiety disorders streaming audio

Similarly Chauhan (2004) described how in a reference Service, for instance, asynchronous tools such as email, subject gateways, FAQs, and interactive tools like chat rooms,

virtual reference desk, and ask-me are used to complement the conventional means of post, phone or in-person reference enquiries. Ask-a-Librarian allows the user to click on ask-a-librarian link to send a formatted enquiry to the reference librarian. The reference librarian either provides an answer, links to resources or link to a subject expert. Interactive tools now allow a reference interview online (Kim and Abbas 2010).

2.5 Effects of Multimedia Technology Application to information service delivery in academic libraries

Multimedia systems use a number of different media to communicate supplementary, additional or redundant information. Often this may take the form of using multiple sensory channels, but it may also take the form of different types of visual input-textual, graphical, animation and video thus presenting information in a way that is interesting and easier to grasp than text alone, (Andrade Macado and Reynoso2008). Multimedia finds its worth in the field of presenting information in a manner that is intuitive and more natural than traditional means A multimedia user interface must provide a wide variety of easily understood and usable media control tools. In addition, the information views need to be integrated with structural views, since the viewing of the information will often alternate moving through the structure by one means or another. It not only helps the customers in providing information from different media (print, microforms, audio and video) on one platform (integrated) but also saves on space, money, maintenance, operational inconveniences, etc. The other advantages of multimedia in university libraries according to Ramaiah(1998) and Gerolimos & Konsta (2011) are:

It can help satisfying different information needs such as reference, enrichment, entertainment, leisure, etc.

It can help meeting various types of information preferences of the customers, such as scholarly, scientific, vocational, artistic, recreational, etc.

Being in digital format, information can also be accessed by remote users on a network.

It also helps in overcoming the barriers of boundaries, proximity and physical capacity of a library to accommodate customers.

It is interesting and easy to use over the existing form such as print, microforms, etc. Audio control and interactivity helps the customers and provides the benefits over books .Electronic information, and multimedia in general, is about to become a vital part of our cultural heritage. Libraries have throughout the history ensured a democratic, independent and free access to the knowledge and intellectual value represented by conventional books. It is evident that this principle is also valid for electronic information and multimedia (IFLA, 2004). The availability of multimedia information through data networks may also open completely new ways for libraries to obtain information for the customers. According to Chen and Xia (2011), multimedia technology can transmit more data of higher quality than traditional medium in unit time and limited area. Besides it is possible to dispose and express much data including both pictures and words, which offer students convenience to conceive words, sounds, pictures and cartoons and its simulation.

2.6 Limitations of multimedia technology application to Information Service Delivery in University Libraries

Even though Multimedia systems have many advantages introducing such systems into offices, schools, colleges, universities, and homes is not easy task. The problems or limitations of multimedia technology, according to Ramaiah (1998) and Kalipsiz (2000) are in two areas :

2.6.1 Technology

The requisite hardware /software to setup a multimedia content creating facility is still very expensive and requires large investments

A wide range of multimedia software is not available to integrate, control, coordinate, manage and adapt different media for the latest human computer interfaces;There is a lack of support software facilitating for the authoring, composition and production of multimedia content; Poor support technology in the area of multimedia data and document storage and manipulation; Similarly there is lack of proper search and pattern recognition capability for locating information from multimedia databases including lack of software support technology for group decision making and cooperative work, especially in application of multimedia technology to cooperative decision making and work. Also, converting all the multimedia resources into digital multimedia and storing is difficult (storage technology limitations)

2.6.2 Skilled Manpower

Lack of trained manpower for the development and management of multimedia databases.Vast amount of work (i.e., 100 to 800 person hours) is required to create an hour interactive multimedia content .Good multimedia content creation requires multi-disciplinary knowledge, multi-technological skills and experience. The main barrier to the widespread use of multimedia technology is the absence of standardization among the various platforms and between hardware and software. For the time being there is no full-strength application of the multimedia information system, however, several universities are working in exploiting the full strengths of multimedia, such as natural language processing, real time A-V content retrieval along with text and date, and implementing such a system in a network environment. The market is dominated by multimedia CD-ROMs, multimedia databases, reference tools, etc (Tilley and Park, 2004). The effectiveness of these systems will depend on various factors such as well developed software programs, information content and development of new information handling skills. The requirements of the effective management are the support of the senior manager, the

professional qualifications, knowledge about IT technology, interpersonal skills and learning models and frameworks and how to use these new resources and to be effective in the information needs of an organization.

2.7 Summary of the Review

This chapter reviews various researches conducted worldwide that are related to multimedia technology application to information service delivery in university libraries. From the review, it was evident that university libraries have for a long time now made use of analogue multimedia technologies in the form of audio-visual materials as media services which were concentrated in the media area of the library. The past years have seen how an explosion in the use of digital media. Industry is making significant investments to deliver digital audio, image and video information to consumers and customers. A new infrastructure of digital audio, image and video recorders and players, on-line services, and electronic commerce is rapidly being deployed. At the same time major corporations are converting their audio, image and video archives to an electronic form. Digital media offer several distinct advantages over analog media: the quality of digital audio, image and video signals is higher than that of their analog counterparts. Editing is easy because one can access the exact discrete locations that should be changed. Copying is simple with no loss of fidelity. A copy of digital media is identical to the original. Digital audio, image and videos are easily transmitted over networked information systems. These advantages have opened up many new possibilities in university libraries.

The challenge of multimedia communications is to provide services that integrate text, sound, image and video information and to do it in a way that preserves the case of use and interactivity so that university libraries in Nigeria can fully key in to these possibilities..

REFERENCES

Aina, A.J & Adekanye E.A (2013) Audio-visual Resources Availability and Use For Library Services Among Colleges of Education in Lagos State Nigeria *International Journal of Library and Information Science* 5(10).

Alhamdani, D. (2008). Roles and Importance of Multimedia in Higher Education. In J. Luca & E Weippl (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008* (pp. 1215-1222). Chesapeake, VA: AACE. Retrieved July 17, 2014 from http://www.editlib.org/p/28540.

Andrade, E ,Mercado, C and Reynoso J (2011) Learning Data Structures Using Multimedia Interactive Systems. *International Journal of Multimedia Applications.8 (3)*

Bida, M.A.(2011). Information Resource Development and Utilization in the University Libraries of Northern Nigeria.*MLIS Unpublished Dissertation, Ahmadu Bello University, Zaria, Dept. of Library and Information Science.*

Bojkovic, Z (2007).”Multimedia Communication System: Modeling, Standardization, Requirements”, in Proc. Int. Conference on multimedia technology and digital Telecommunication Services, ICOMPT’96, pp.5-13,Budapest, Hungary,

Chen, S. and Xia, Y. (2012). *Research on Application of Multimedia Technology in College Physical Education.* 2012 International Workshop on information and Electronics Engineering(IWEE). ProcediaEngineering29(4213-4217).

Cheung,E (2003). Multimedia Systems. *Multimedia Production and Web Authoring.* Accessed on 6/6/2014 from http??www.polyu.edu.hk

Clark, J.(2013). Developing a Digital Video Library with Youtube Data API *Code{4}lib* vol. 20 Accessed from wwww.journal.code4lib.org/articles/7847 on 19/02/2014

Cox, R.V. et al.,(2008) “On the Applications of Multimedia Processing to Communications”, *Proceedings. of the IEEE*, vol.86, pp.755-824,

Crawford, W. (2006), "Library 2.0 and "Library 2.0"", *Cites And Insights*, 6 (2): 1-32, Accessed on 10/02/2014 at: http://citesandinsights.info/civ6i2.pdf.

Crawford, Walt (2009), "Making it Work: Library 2.0 revised", Cites And Insights, 9 (9): 25-32, Accessed on 10/02/2014 at: http://citesandinsights.info/civ9i9.pdf.

Crawford, W., (2011a), "Five Years Later: Library 2.0 and Balance", Cites and Insights, 11 (2): 1-26,accessed on 10/02/2014at: http://citesandinsights.info/civ11i2.pdf.

Crawford, Walt, (2011b), "Five years later: Library 2.0 and balance (cont.)", Cites and Insights, 11 (3): 1-22,accessed on 10/02/2014at: http://citesandinsights.info/civ11i3.pdf.

Doty, D. E., Popplewell, S. R., & Byers, G. O. (2001). Interactive CD-ROM Storybooks And Young Readers' Reading Comprehension. *Journal of Research on Computing in Education,* 33(4) 374-384.

Ganglier, T(2011). *Semantic Federation of Musical and Music Related Information For establishing Personal Music Knowledge-Base.*A Diploma Thesis of the Technische Universitat Dresden, Dept. of Computer Science, Institute for Systems Architecture, Chair of Computer Networks.

Ganiyu, M.A. &Akinreti, Q. (2011).*Secrets of Online and Multimedia Journalism: A Manual for Online and Multimedia Journalism Practice in Africa*. Ibadan: Emgee Publishing Limited.

Gbaje, E.S. (2007). Provision of Online Information services in Nigerian Academic Libraries. Nigerian Libraries: *Journal of Nigerian Library Association* 40. p.1

Gerolomos, M and Konsta, R(2011). Services for Academic libraries in the New Era. *D-lib Magazine* vol.17 (7/8).

Godia, K. (2007). *Access And The Changing trends in Libraries*.-Delhi: Adhyayan Publishers and Distributors.

Jumping, Su, et. al (2008). The Application of Multimedia in Academic Library. Proceedings of the International Conference on Multimedia and Information technology Held at Three Georges, China.

Kalipsiz, O. (2000). Multimedia databases. *Proceedings of IEEE International Conference,* 111-115. Retrieved, May4,2009,from: http://ieeexplore.ieee.org.proxy.library.msstate.edu/

Kanamadi and Kumbar (2006)Web-Based Services Expected from Libraries: A Case Study of Management Institutes in Mumbai City.*Webology*,3()2

Karim,S.N, Darus S.H. and Hussin, R (2012). Mobile Phone Application Services in Academic Libraries: A students Feedback Survey. Retrieved March 5th from www.emeraldinsight.com/1065-0741.htm

Koumi, J. (2003). Synergy Between Audio Commentary And Visuals in Multimedia Packages. *Journal of Educational Media*,28(1), 19-34.

Luvhua, T.(2011). Multimedia Application Research in Sport Education. *Procedia Engineering, Elsevier Ltd Selection and peer-review under responsibility of ceis.*

MacArthur, C. A., & Haynes, J. B. (1995). Student Assistant for Learning from Text (SALT): A hypermedia reading aid. *Journal of Learning Disabilities*, 28, 150-159.

Madhusudhan, M and Namabhushanam, V.(2012). Use of Web-based Library and Information Services in India: A Study. *International Journal of Library and Information Studies.*20(4) .

Moore-Hart, M. A. (1995). The Effects of Multicultural Links on Reading and Writing Performance and Cultural Awareness Of Fourth and Fifth Graders.*Computers in Human Behavior*, 11(3-4), 391-410.

National Center for Education Statistics. (2002). *Internet Access in Public Schools,1994-2001*. Retrieved June 5, 2011, from http://nces.ed.gov/pubsearch /pubsinfo.asp?pubid

Neuhold E and Niederee (2013). Multimedia Libraries - Role of DigitalLibraries in Content-to-Community Mediation, Metadata and Search Services Retrievedon 14/04/2014

Newton, L.R., & Rogers, L. (2001 *Teaching science with ICT*. London: Continuum. *Nigerian Tertiary Education-universities, polytechnics, and Colleges of Education*(2012).retrieved on04/122012 from http://www.lawnigeria.com/laweducation/universities/polytecniques/cegesofeducation

Nkanu, W. O. and Okive, H.I. (2010). Digital Divide: Bridging the Gap through ICT in Nigerian Libraries. *Library Philosophy and Practice.*

Oberhauser, O.(2011).Interactive Multimedia in Library and Information Services. *Audio-Visual Librari*an 27(1)

Ogunlana, E. F.(2012). Perceived Use of Networked Multimedia Applications on Learning in Selected Universities in South West Nigeria. Library *Philosophy and Practice*.

Omagbemi, C.O., Akinola, B.A. and Olayiwola I.B. (2004). Academic libraries, the Internet and its potential impact on teaching and learning in Nigerian tertiary institutions. *Journal of Library and Information Science,* 1 (1 & 2), pp. 34-46.

Oshinaike A.R. and Adekunmisi S.R.(2011) Use of Multimedia for Teaching in Nigerian University System: A Case Study of University of Ibadan. *Library Philosophy and Practice.*

Ou, C. & Zhang, K. (2006). Teaching with database: Begin with the Internet. *Tech Trends,* 50(5), 46-51.

Pace, A. (2003).Virtual Reference: What's in a Name?. *Computers in Libraries**23** (4): 55–56.*

Salina (2010).*Role of Multimedia in Education*. Retrieved on 28/112012 from http://www.slideshare.net/salina

Siddiqui, M. H. (2008). *Challenges of Educational Technology*. Delhi: Balaji Press.

Sierra-Fernandez, J. L., & Perales-Palacios, F. J. (2003).The effect of instruction with computer simulation as a research tool on open-ended problem-solving in a Spanish classroom of 16-year-olds.*Journal of Computers in Mathematics and Science Teaching,* 22(2), 119-140.akum

Schnotz, W., & Bannert, M. (2003). Construction and interference in Learning from Multiple Representation. *Learning and Instruction*, 13, 141-156.

Schnotz, W. & Kürschner, C. (2007). A Reconsideration of Cognitive Load Theory. *Educational Psychology Review*, 19,

Ramaiah, C. K.(2008) Multimedia Systems in Libraries and their Applications *DESIDOC Bulletin o Information Technology, Vol.* 18, *No 6*, pp. *25-40.*

Rao,Y.S. and Coughury, B.K.(2010). Networked Services in the NIT Libraries in Zone wise *Library Collections, Acquisitions & Technical Services*34.

Roblyer, M. D., & Schwier, R. A. (2003).Integrating Educational Technology into Teaching. Toronto: Pearson Education Canada Inc. *The International Journal of Multimedia & Its Applications (IJMA)*.3(1).

Rosenberg, J et al.,(2002) Multimedia Communications For users ,*IEEE Comm. Magazine*, vol.30, pp.20-36.

Top 100 Universities in Nigeria and their Ranking(2014). Retrieved from http://www.naijagist.com on 10/12/2012

Vanankamudi, V and Padma, P (2014).Multimedia Application in Digital Environment of College Libraries. *Shanlax International Journal of Arts, Science and Humanities 1(3)*

Wang, Y. & Lin, C. (2004). A Multimedia Database Supports English Distance Learning. *Informartion Science*, 158, 189-208.

What are information services? (2009) Retrieved from http://www.olc.org on 20/12/2012

Windschitl, M. (2000).Using the WWW for teaching and learning in classrooms: What are the interesting research questions? *Cyber Psychology& Behavior,* 3(1),89-96.

Wolf, L. C. Griwadz, C & Steinmetz, R. "Multimedia communication", *Proc. of the IEEE*, vol.85, pp.1915-1933.

Woodsworth, A and Williams, J.F.(2012). Managing the Economies of Owning, Leasing and contracting out Information Services Aldershot, Hunt: Ashgate Publishing Limited.

Yu, C and Brandenberg, T. (2011) Multimedia Database Applications: Issues and Concerns For Classroom Teaching. *The International Journal of Multimedia & Its Applications (IJMA)* 3 (1).

Yu, C., Williams, A., Lin, C. F., & Yu, W. C. (2008).*Planning Effective Multimedia Instruction.* In Terry T. Kidd & Holim Song (Eds.), Instructional systems and technology 1 Hershey, PA: Information Science Reference. pp 216-231

Zhuang (2005) Digital libraries: A test bed For Multimedia Technology Journal of Zhejiang, University of science 6A(11):1202-1203

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter described the strategies and procedures adopted in the conduct of this study. The chapter treated the following sub-headings: Research method adopted, population of the study, sample size and sampling procedure, instrumentation, validity of the instrument, method of data collection and analysis.

3.2 Research Method Adopted

Survey research design was adopted for this study because it is characterized by selection of sample from large and small population (Osuala 2001). Asika (1991) remarks that it is always difficult to study all the subjects or items in a large population.. Researchers, therefore, select a sample from the population using some techniques of sampling. Hence, the purpose of adopting survey research is to enable the researcher reliably gather data on multimedia technology applications to information service delivery in the academic libraries in the Northern states of Nigeria.

3.3. Population of the Study

A target population of ten university libraries comprising of first and second generation Federal universities in the Northern states of Nigeria constituted the population of the study. These are as follows: Abubakar Tafawa Balewa University, Bauchi; Ahmadu Bello University, Zaria; Bayero University, Kano; Federal University of Agriculture, Makurdi; Federal University of Technology Minna, Federal University of Technology, Yola; University of Ilorin; University of Jos, Jos; University of Maiduguri, Maiduguri, and Usmanu Danfodiyo University, Sokoto. The ten (10) institutions constituted the population of this study and are presented in Table 3.3.1.

Table 3.1. Professional Librarians of the Population under Study

S/N	Institution	No of professional librarians
1	AbubakarTafawaBalewa University, Bauchi.	31
2	Ahmadu Bello University, Zaria.	116
3	Bayero University, Kano.	33
4	Federal University of Agriculture, Makurdi.	46
5	Federal University of Technology, Minna.	29
6	Federal University of Technology, Yola.	23
7	University of Ilorin, Ilorin.	44
8	University of Jos, Jos.	22
9	University of Maiduguri, Maiduguri.	32
10	Usmanu Danfodiyo University, Sokoto.	31
	Total	407

Source: Field Survey, 2013

The respondents for the study were the professional librarians in the study area from whom information relating to type of multimedia technologies available and used were obtained in the departments under study.

3.4 Sample, Sample Size and sampling Procedure

Out of the 10 university libraries identified for the study, purposive sampling technique was used to select two universities libraries from North Eastern Zone, two from North Central Zone and two from North West one. Depoy & Gitlin (2005) observed that purposive sampling

can be used when there is need for a researcher to be deliberate in choice of sample based on predefined ccriteria. The institutions were: AbubakarTafawa Balewa University Bauchi, University of Maiduguri, Federal University of Technology, Minna, University of Jos, Ahmadu Bello University, Zaria, Bayero University Kano. A total sample size of eighty one professional librarians from the six university libraries were selected for the study. The cadre of librarians selected was done through purposive sampling technique because only the librarians involved in the multimedia technologies application to information service delivery constituted the target population for the study. According to Bell (2007) purposive sampling places participants in groups relevant to criteria that fits the research question.

Table 3.2 Sample Distribution Across Institutions

S/N	Institution	No of librarians	No of librarians selected
1	AbubakarTafawaBalewa University, Bauchi.	31	9
2	Ahmadu Bello University, Zaria.	116	35
3	Bayero University, Kano.	33	11
4	Federal University of Technology, Minna.	29	9
5	University of Jos, Jos.	22	7
6	University of Maiduguri, Maiduguri.	32	10
	Total	263	81

3.5 Instruments for Data Collection

Questionnaire and direct observation were used as research instruments for data collection. The choice of the questionnaire as an instrument was to measure the opinions of the respondents. Questionnaire according to Omotosho (2001), is a "form containing prepared

information to which the respondent is expected to supply answers." Questionnaire will seek to find out the extent of the respondents' agreement to statements on the adequacy of the existing multimedia technology facilities in the selected tertiary institutions in Northern states of Nigeria.

The Likert-Type Scale technique of data gathering and processing was used. This technique assigns grade value to the response of respondents. A number of statements on the adequacy of the existing multimedia technology facilities tertiary institutions in the northern state of Nigeria will be written out with five alternative responses. The response categories were "Strongly agree", "Agree", "Uncertain", "Disagree", "Strongly disagree". The technique assigned score value to the response of respondents.

All statements will be scored as follows, based on the response to the items:

(a) Strongly agree 5 (b) Agree 4 (c) Uncertain 3 (d) Disagree 2 (e) strongly disagree (1). .Depoy &Gitlin (2005) believes that when Likert scale technique is used, it will be possible to report in percentages. Combining outside categories on the 5-point scale could do this. Statements that contrast the required point of view will be scored in opposite order. In this study percentages will be used to show the relative frequency distribution according to respondent's personal stand.

3.5.1 Observation

This is a direct method of studying overt situations or behaviors. It enables the observer to see at first hand, the actual situation and characteristics as they exist. Ndakotsu (2006) pointed out that it is either controlled where aspects to be observed are predetermined or uncontrolled where the observer takes clues from unexpected events. The advantages of observational methods of collecting data are obvious. Events are recorded as they occur. It is necessary to rely

on the willingness and ability of respondents to report accurately. Data collected by observation are usually more objective and more accurate.

3.6 Validity and Reliability of Research Instrument

Content validity method was used as the most suitable for verification of the questionnaire items. This method has also been found to be most favourable by researchers such as Kerlinger (1973) and Gay(1976). They both hold the view that validation of the content of research instruments by experts is an important and acceptable technique.

In agreement with Kerlinger (1973) and Gay (1976), the instruments for this research was validated by experts in the library .Thus the consensus of the experts on the Likerts-type scale questionnaire used in this study was regarded as valid**.** Apart from the validation of the instrument, the calculated coefficient was got as 0.75 and 0.82 through split half method using Spearman Rank correlation. This showed that the instruments were highly reliable for conducting such research.

3.7 Pilot Study

To ensure the validity of the instruments used, the questionnaire and checklists used were presented to some staff of Kaduna State University Library. The questionnaire in its present form had therefore taken into consideration the observations and suggestions made by staff of Kaduna State University Library. The researcher produced 20 copies of the questionnaire which were personally distributed and retrieved at Kaduna State University Library. The Reliability coefficient of the pilot study was 0.82.

3.8 Procedure for Data Collection

The researcher administered the questionnaire. In addition, Three personal assistants helped to ensure timely distribution and collection of the copies of questionnaire administered.

Best and Khan(1989) asserted that questionnaire administered personally to a group of individuals had a number of advantages as the person administering the instruments has the opportunity to establish rapport and explain the missing items that might not be clear to them.

3.9 Method of Data Analysis

The data collected were analyzed using simple statistical techniques such as frequency counts, percentages, tables, and charts. Kerlinger (as cited in Timothy, and Yair, 2008; Muhammad 2011) explained that percentage method could be used to reduce different set of numbers to a common base, and any set of frequency can be transformed to percentage in order to facilitate statistical manipulation and interpretation. The hypotheses were tested using inferential statistics. Specifically, hypothesis I was tested using Chi-square, while hypothesis II and III were tested using correlation procedure.

REFERENCES

Bell, J. (2007) Doing Your Research Experiment: A Handbook for First Time Research in Education and Social Science. London Open University Publishing Press

Depoy &Gitlin (2005). *Introduction To Research: Understanding Multiple Strategies.* St Louis Elservier, 2005

Gay, J.R.()1976). Educational Research Competencies for Analysis and Applications. London: Merill Publishing company

Kerlinger, F.N. (1973). *Fundamentals of Behavioral Research*. New York: Hall Reinhart.

Ndakotsu, J.J. (2006). Effectiveness of Vocational and Technical Education for Development in Niger State. *Unpublished PhD Thesis, Bayero University, Kano.*

Omotosho, A.(2001). *Statistics*._ Ibadan : N P S Educational Publishers Ltd.

Osuala, E.C. (2000). *Introduction to Research Methodology._3rd ed*. Onitsha:Africana Publishers Ltd.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1. Introduction

This chapter focused on the presentation and analysis of the information obtained from the questionnaire issued to the respondents. The chapter is presented under the following sub-headings

4.2 Response rate

4.3 Data analysis and Discussion

4.4 Descriptive Analysis.

4.4.1 Inferential Analysis

4.2 Response Rate

A total of 81 copies of questionnaires were distributed to the professional librarians in the departments of the six selected libraries where information services were provided using multimedia technologies. 65(80.2%) of the copies of the questionnaire were completed and returned. 16(19.8%) were unreturned due to complaints from respondents who procrastinated in filing them thereby resulting to non return despite the fact that the researcher gave enough time for the completion of the questionnaire which resulted to more than one visit to collect them. The response rates of the respective universities in the region were presented in Table 4.1.

Table 4.1: Response Rate Used For the Study

University Libraries	Library Departments											
	Media		ICT		Customer Service		Reference		Resource Processing		Total	
	QA	QR	QA	QR	QA	QR	QA	QR	QA	QR	QA	QR
KIL/ABU Zaria	6	4	9	6	8	5	6	3	6	4	35	22
ATBU Library	4	3	5	4	0	0	0	0	0	0	9	7
BUK Library	9	9	2	2	0	0	0	0	0	0	11	11
IBB Library, FUTM	7	7	1	1	0	0	0	0	1	1	9	9
UNIJOS Library	5	5	0	0	2	2	0	0	0	0	7	7
UNIMAID library	5	4	1	1	3	3	0	0	1	1	10	9
Total	36(44.4)	32(49.2	18(22.2)	14(21.5)	13(16.0)	10(15.4)	6(7.4)	3(4.6)	8(9.9)	6(8.2)	81(100)	65(80.2)

KEY:QA=Questionnaire Administered, QR=Questionnaire returned

Table 4.1 above showed that a total of 81copies of questionnaire were issued to the respective cadre of librarians in the six universities, with the indicated numbers for each of the universities respectively. In Bayero University Kano (BUK), Federal University of Technology Minna (FUT) and University of Jos (UJ), the response rate was complete with 100.0%. In Ahmadu Bello University, out of the 35copies of questionnaires issued, 22 representing 62.9% were returned. Persistent effort to retrieve the exact number administered failed as many of the respondent requested for more time to be returned. Nine (9) or 90.0% of the 10 copies issued to staff of the University of Maiduguri was returned. In AbubakarTafawa Balewa University (ATBU), out of the 9 copies of the questionnaires issued, 7(77.8%) were returned. In all, 65 or 80.2% of the 81copies of the questionnaires issued were successfully filled and returned and were therefore used for the study.

4.3 Descriptive Analysis of the Socio-Demographic Characteristics

This section presented the socio-demographic characteristics of the library staff involved in the study. Apart from the university, other selected demographic variables used were sex, working experience, highest educational qualification, the department in which the respondents worked and the level of their computer literacy. Each of these variables is tabulated in frequencies and percentages by their respective university.

4.3.1. Classification of the Respondents by Their Respective Departments in the Libraries

The respondents were classified by their departments or divisions or units within the respective libraries. . This goes a long way to indicate the relationship between multimedia application and the type of information service delivered. The responses are shown in table 4.2. below.

Table 4.2. Classification of Respondents by Departments

University Libraries	Library Departments										Total
	Media		ICT		Customer Service		Reference		Resource= Processing		
	F	%	F	%	F	%	F	%	F	%	
KIL/ABU Zaria	4	6.2	6	9.2	5	7.7	3	4.6	4	6.2	22(33.9)
ATBU Library	3	4.6	4	6.2	0	00	0	00	0	00	7(10.8)
BUK Library	9	13.8	2	3.1	0	00	0	00	0	00	11(16.9)
IBB Library, FUTM	7	10.8	1	1.5	0	00	0	00	1	1.5	9(13.8)
UNIJOS Library	5	7.7	0	00	2	3.1	0	00	0	00	7(10.8)
UNIMAID library	4	6.2	1	1.5	3	4.6	0	00	1	1.5	9(13.8)
Total	30	46.2	5	7.6	20	30.8	3	4.6	6	10.8	65(100)

Classification of Respondents by Departments

Table 4.2. above indicated that all the universities had representatives from the Media section. But in Resource Processing (Cataloguing) Department only ABU, FUT and UNIMAID were represented. There were no representative from ATBU, BUK and UJ .In ICT division, all the Libraries were also represented but only ABU had representation from the Reference Division. Similarly only ABU and UNIMAID had representation from Customer Service Division. In all 32 or 49.3% were from the media section while 6 or 9.2% were from Resource processing (cataloguing). Those from ICT division were 14 or 21.5% while those from Reference division were 3 or 4.6 and those from Customer Service were 10 or 15.4% of the total respondents. The distribution means that not all the sections of the libraries could be said to be represented in the study. This reflected the views of Alhamdani (2008) that even though multimedia, as a product and application, can have potential roles in enhancing learning, certainly the technology has not been predominantly applied in many university libraries.

4.3:2 Classifications of the Respondents by their Gender in the Libraries Studied

In an attempt to analyze the collected data along the lines of structural contextual patterns, the respondents were categorized into two by gender (male and female) and the responses are presented in table 4.3.

Table 4.3. Classifications of the respondents by their gender in the libraries

University Libraries	Sex of Respondents											
	Media		ICT		Customer Service		Reference		Resource Processing		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
KIL/ABU Zaria	3(4..6)	1(1.5)	5(7.7)	1(1.5)	2(3.1)	3(4.6)	3(4.6)	-	3(4.6)	1(1.5)	16(24.6)	6(9.2)
ATBU Library	3(4.6)	O(00)	3(4.6)	1(1.5)				--	-	-	6(9.2)	1(1.5)
BUK Library	7(10.8)	2(3.1)	2(1.5)	1(1.5)	-	-	-	-	-	-	8(12.3)	3(4.6)
IBB Library, FUTM	4(6.2)	3(4.6)	1(1.5)		-	-	-	-	1(1.5)		6(9.2)	3(4.2)
UNIJOS Library	3(4.6)	2(3.1)			1(1.5)	1(1.5)	-	-	-		4(6.2)	3(4.6)
UNIMAID library	2(3.1)	2(3.1)	1(1.5)		2(3.1)	1(1.5)	-	-	1(1.5)		6(9.2)	3(4.6)
Total	22(33.8	10(15.4)									46(70.7)	19(29.2

KEY: M=Male, F=Female

Classifications of the Respondents by their Gender in the Libraries from the responses shown in Table above, it is evident that there are more male professional librarians 46(70.7%) in the selected university libraries for the study while the female librarians were 19(29.3%). This showed that multimedia technology used by both males and females in university libraries under study.

4.3.3: Classifications of the Respondents by Their Years of Working Experience

Working experience is assumed to constitute how much skills can be deployed in undertaking an effective service to customers. Table 4.3.3 indicated the years of working of working experience of respondents

Table 4.4 Years of Experience

Years of service	UNIVERSITY LIBRARIES																													
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAD				
	REF	MED	CRD	ICT	RPD	REF	MED	ICT	CRD	RPD	REF	MED	CRD	ICT	RPD	REF	MED	CRD	ICT	RPD	REF	MED	CRD	ICT	RPD	REF	MED	ICT	CRD	RPD
1-5years	3(4.6)	2(3.1)	1(1.5)	4(6.2)	3(4.6	--	2(3.1)		-	-	---					-		-		--	-				-	-				
6-10 years		2(3.1)				--		2(3.1)						.1(1.5		-	3(4..6	-	4(6.2)	-	-	2(3.1		3(4.2	-	-		3(4.6		
11-15 years			2(3.1)			-	1(1.5)					4(6.2				--				-	-	2 28.		3.1		-			2 22	
16-20 years					1(1.5	-		2(3.1)	-	-		5(7.7		1(1.5		--	8 88.9	-			-	6 85.7			-		4 44			
20 and above						-										--	3 33.3	-	-	-	-							2 22		

Years of Experience

Key: Ref=Reference Dept.,

MED=Media Dept,

CRD=Customer Relation Dept.,

ICT=ICT Dept

In terms of years of experience, 15 (23.1%) of the respondents have been on the job for between one to five years. But 14 (21.5%) of the respondents have been on the job for between 6 to 10years while 14 (21.5%) said their years of experience on the job is between 11 and 15years. Of the total respondents, 14 (21.5%) have been working in the libraries for between 16 and 20years. Only 5 (7.7%) of the total respondents said they have more than 20years of experience on the job. By these years of services, the respondents would be expected to have, atleast, relevant knowledge of media application to information service delivery in the university libraries under study.

4.3.4 Distribution of the Respondents by Their Academic Qualifications

Academic qualification of individuals entails their intellectual development. It is assumed that as they grow in their academic ladder the use of ICTs will enhance their productivity, recognition and experience in research and information service operations. Table 4.3.5 shows the respondents academic qualifications. The percentages imply that the opinions of the averagely high educational status of the librarians indicated that such people were considered enlightened enough to understand and appreciate the phenomenon under investigation and hence offer views that could lead to reliable findings on multimedia technology application to information service delivery.

Table 4.5. Academic Qualification

Academic qualifications	UNIVERSITY LIBRARIES																													
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAD				
	REF	MED	CRD	ICT	RPD	REF	MED	ICT	CRD	RPD	REF	MED	CRD	ICT	RPD	REF	MED	CRD	ICT	RPD	REF	MED	CRD	ICT	RPD	REF	MED	ICT	CRD	RPD
BLS	3(4.6)	3(4.6)	5(7.7)	4(6.2)	3(4.6)	--	2(3.1)	3(4.6)	-	-	---	5(7.7		5(7.7		-	2(3.1	-	4(6.2	--	-	4(6.2			-	-	4(6.2	3(4.6	1(1.5		
MLS		1(1.5)		1(1.5	1(1.5	--		2(3.1				1(1.5				-	3(4.6	-		-	-			3(4.6	-	-		1(1.5			
Others						-										-				-	-					-				
																-														
Total	3(4.6	4(6.2	5(7.7	5(7.7	4(6.2	-	2(3.1	5(7.7	-	-		6(9.2		5(7.7		--	5(7.7	-	4(6.2		-	6(9.2		3(4.6	-		4(6.2	3(4.6	1(1.5	65(100

Academic Qualification

Key: **REF=Reference Dept,** **MED=Media Dept,**
CRD=Customer Relation Dept, **RP=Resource Processing, Dept**

The table revealed that only two professional qualifications were that 52(80%) respondents had the Bachelor of Library Sciences (BLS) while 13 (20%) had the Master degree in Library Sciences (MLS). The distribution of these two certificates showed that the BLS has the highest percentage (80%) among the respondents from all the six universities.

4.3.5 Types of Multimedia Technology available in university libraries

One of the specific objectives of the study was to determine the types of multimedia technology that are available for information services delivery in the University libraries in Northern states of Nigeria. In line with this, a list of available multimedia technology was provided for the respondents to select from. This objective is followed by the provision of table 4.6. lists the different technologies by their respective universities studied.

Table 4.6. Types of Multimedia Technology Available for Information Services in University Libraries

Multimedia Technology types	UNIVERSITY LIBRARIES																													
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAD				
	RS	CAS	CRS	UE	IL	RS	CAS	CRS	UE	IL	RS	CAS	CRS	UE	IL	RS	CAS	CRS	UE	IL	RS	CAS	CRS	UE	IL	RS	CAS	CRS	UE	IL
Streaming stored Audios	√	√	√	√	√	√	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√
Streaming stored video	√	√	√	√	√	√	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√
Streaming live audio	√	√	√	√	√	√	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√
Live interactive video	-	-	-	-	-	-	-	-	-	-	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Live interactive audio	-	-	-	-	-	-	-	-	-	-	--	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Types of Multimedia Technology Available For Information Services in University Libraries

Key: RS = References Service
CAS = Current Awareness Service
CRS = Customer Relations Service
MED = Media Services ,
IL = Information Literacy
[√]= Available; [-] Not Available

Table above indicated that none of the university libraries studied had live interactive audio and live interactive video Similarly, none of the libraries except Kashim .Ibrahim Library, Ahmadu Bello University had multimedia applied to reference services. It is important to say that the use of multimedia technology has great significance in colleges, universities and research institutions in the Western countries. In these countries, the technology is being seen as a key player to development in all ramifications and essential component of education.

Furthermore the presence of multimedia technology in the selected university libraries made this researcher to find out their level of use...

4.3.6 Use of Multimedia Technology For Information Service Delivery in the University Libraries in Northern States of Nigeria

Since University libraries have integrated multimedia technologies into their operations, is important to find out which of these are used for information service delivery in the selected university libraries In Table 4.3.6, the types of the multimedia technologies used for information services delivery by the libraries are listed with the agreement by the Library Departmental Heads from the universities studied.

Table 4.7: Types of multimedia technologies used for Information Service Delivery by the University Libraries

Multimedia Technology types	UNIVERSITY LIBRARIES																													
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAD				
	RS	CAS	CRS	MED	IL	RS	CAS	CRS	MED	IL	RS	CAS	CRS	MED	IL	RS	CAS	CRS	MED	IL	RS	CAS	CRS	MED	IL	RS	CAS	CRS	MED	IL
Streaming stored Audios	√	√	√	√	√	√	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√
Streaming stored video	√	√	√	√	√	√	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√
Streaming live audio	√	√	√	√	√	√	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√	-	√	√	√	√
Live interactive video	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Live interactive audio	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Types of Multimedia Technologies Used For Information Service Delivery by the University Libraries

Key: RS = References Service
CAS = Current Awareness Service
CRS = Customer Relations Service
MED = Media Services
IL = Information Literacy; [√]= Available; [-]; Not Available

Table above indicated that none of the university libraries studied used live interactive audio and live interactive video. Similarly, none of the libraries (except Kashim .Ibrahim Library, Ahmadu Bello University) used multimedia for reference service. This observation disagrees with IFLA's view that irrespective of the type of type of library, all information services to be provided using multimedia technologies, (IFLA 2004).

4.3.7 How multimedia technology is applied to Information Service Delivery by the University Libraries

The research aimed to know how multimedia technology was used in university libraries. Many applications such as web-based training materials and computer based training materials such Power Point presentations, tutorials, feature films, and documentaries, etc, were examined in this light. Table 4.7 provided respondents information.

Table4.8.Use of Multimedia Technology in Information Service Delivery

How MULTIMEDIA IS APPLIED TO INFORMATION SERVICE	UNIVERSITY LIBRARIES																												
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAID			
	RF	CAS	CRS	MED	IL	RF	CAS	CRS	MED	IL	RF	CAS	CRS	MED	IL	RF	CAS	CRS	MED	IL	RF	CAS	CRS	MED	IL	RF	CAS	CRS	ME
Power Point presentation					4(6.2)					3(4.6					(9.26					4(62					5(7.7				
Tutorials		7(10.8					0					2(3.1					0					0					0		
Reference Tools	3(4.6)					-															0								
Documentaries				4(6.2)					5(7.7)					(10.89					7(10.8					6(.9.2				7(18
Feature Films			5(7.7)					6(9.2					11(16.9					8(12.3				6				9(13.8		
Video conferencing, youtube etc				1(1.5)					0					4(6.2					4(6.2					0				4(6

Use of Multimedia Technology in Information Service Delivery.

KEY:

RS = References Service

CAS = Current Awareness Service

CRS = Customer Relations Service

ME = Media Services

IL = Information Literacy,

Table 4.7 above showed that the application of the multimedia technologies varies widely by the different universities. For example, in ATBU, BUK, FUT, UJ and UNIMAID most respondents as indicated in the table were of the opinion that they were mostly used for documentaries. But in ABU, only 4 (6.2%) of the respondents agreed that the multimedia technologies available were used for documentaries. In BUK 2(3.1%) agreed that the multimedia technologies available were used for tutorials. Other applications of the multimedia technologies that cut across most of the universities are feature films. Among respondents from ATBU 6(9.2%) agreed that the multimedia technologies were used for feature films.. From these observations it would mean that Streaming live audio, streaming stored video, streaming live video and streaming stored audio were the major multimedia technologies used for information service delivery in the University libraries studied.. The finding here agrees with Emily (2013) who expounds the several modes of multimedia applications to include streaming stored audio and video, streaming live audio and video, real time interactive audio and video, , interactive TV, download-and-play applications and those distributed and/ or, embedded digital objects within webpage, talking books,

4.3.8 Types of information services provided using the multimedia technology application in the University libraries in the Northern States of Nigeria

Among the objectives of the research was to determine the types of information services that were provided using multimedia technologies in the University libraries in the Northern States of Nigeria. Table 4.3.8 showed the frequencies and percentages of agreement by the respondents from the different universities on the information services that were provided using multimedia technologies.

Table 4.9 Types of information services provided using multimedia technologies.

Information service Types	UNIVERSITY LIBRARIES																														Total
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAD					
	REF	MED	CRD	ICT	RPD	REF	MED	ICT	CRD	RPD	REF	MED	CRD	ICT	RPD	REF	MED	CRD	ICT	RPD	REF	MED	CRD	ICT	RPD	REF	MED	ICT	CRD	RPD	
Reference services	3(4.6					--			-	-	--					--	2(3.1		-	--	-				-	-					5(7.7)
Current Awareness services		5(7.7				--								4(6.2		-	3(4.6	-	4(6.2	-	-	2(3.1		3(4.6	-	-		3(4.6			26(40)
Customer Relation service			9((7.7			-	5(7.7	2(3.1				4(6.2				--				-	-	2(1.5				-			2(3.1		
Media Services				4(6.2		-	3(4.6		-	-		6(9.2				--	4(6.2	-			-	3(6.2			-		4(6.2				24(36.9
Information literacy					4(6.2	-	15(1.								6(9.2	--	3(4.6	-	-	-	-								2(1.2			1624.6

Types of information services provided using multimedia technologies.

Key: **REF=Reference Dept, MED=Media Dept,**
CRD=Customer Relation Dept, ICT=ICT Dept. RPD =Resource Processing Department

Table4.8 above revealed that Information literacy was provided with the use of the multimedia application in the University libraries. From the table, 50 (76.9%) of the total respondents agreed with this provision and the individual responses from the respective universities in the table all point to the fact that information literacy services were mostly provided with multimedia technology application in the University libraries. Others like the reference services were current awareness services were not major using the multimedia technology applications. The percentage scores for agreement of their provision with the multimedia applications from the Table were 46.2% and 40.0% respectively. The least affected in the provision with the multimedia technology applications were customer relation service and user education services with percentages for agreement as 30.8% and 29.2% respectively. In other words, the information services provided using the multimedia applications in the libraries were basically those concerned with Information literacy. The finding here agrees with Terwel, Kuiper and Volman, (2005) who reported that most of the libraries use multimedia resources for instructional purpose as well as in training using tutorial packages. For instance, multimedia tutorials are available on how to do online searching, how to use Boolean operators, how to decipher bibliographic citations as well as guide for performing a virtual tour for electronic library.

4.3.9 Effects of multimedia technology applications to information service delivery in the University libraries in the Northern States of Nigeria

The fourth specific objective of the study was to determine how effective multimedia technologies were to information service delivery in the University libraries in the Northern States of Nigeria. This objective was aided with the fourth research question of the study.A number of items were used to assess the effect of the multimedia technology applications in the information service delivery of the University libraries. The total responses of all the universities

were taken together in this table because the diversity in the expressed opinions on the items was very low. The individual university opinion is shown in Appendix II. Frequencies of the expressed opinions and the corresponding percentages are tabulated on the five point Likert scale in Table 4.9.

Table4.10a Effects of multimedia technology on information services

Effect of Multimedia Technology	UNIVERSITY LIBRARIES																														
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAD					
	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	TOTAL
It helps in satisfying different information needs such as reference, enrichment, entertainment, leisure, etc	4(6.2	10(15.4	3(4.6	4(6.2	1(1.5	1(1.5	3(4.6	1(1.5	1(1.5	1(1.5	2(3.1	6(9.2	1(1.5	1(1.6	1(1.5	1(1.	5(7.7	2(3.1	1(1.5)	--	2(3.1)	3(4.6)	1(1.5)	--	1(1.5)	1(1.5)	5(4.60	1(1.5)	1(1.50	1(1.5)	65(100.)
helps in meeting various types of information preferences of the customers such as scholarly scientific vocational, artistic, recreational	4(6.2	10(15.4	3(4.6	4(6.2	1(1.5	1(1.5	3(4.6	1(1.5	1(1.5	1(1.5	2(3.1	6(9.2	1(1.5	1(1.6	1(1.5	1(1.	5(7.7	2(3.1	1(1.5)	--	2(3.1)	3(4.6)	1(1.5)	--	1(1.5)	1(1.5)	5(4.60	1(1.5)	1(1.50	1(1.5)	65(100.)
It is interesting and easy to use over the existing forms such as print, microforms and other analogue formats audio	4(6.2	10(15.4	3(4.6	4(6.2	1(1.5	1(1.5	3(4.6	1(1.5	1(1.5	1(1.5	2(3.1	6(9.2	1(1.5	1(1.6	1(1.5	1(1.	5(7.7	2(3.1	1(1.5)	--	2(3.1)	3(4.6)	1(1.5)	--	1(1.5)	1(1.5)	5(4.60	1(1.5)	1(1.50	1(1.5)	65(100).
Being in integrated platform it saves money, space and operational inconveniences	4(6.2	10(15.4	3(4.6	4(6.2	1(1.5	1(1.5	3(4.6	1(1.5	1(1.5	1(1.5	2(3.1	6(9.2	1(1.5	1(1.6	1(1.5	1(1.	5(7.7	2(3.1	1(1.5)	--	2(3.1)	3(4.6)	1(1.5)	--	1(1.5)	1(1.5)	5(4.60	1(1.5)	1(1.50	1(1.5)	65(100).

Effects of Multimedia Technology on Information Services

Table 4.10b Effects of Multimedia Technology on Information Services (contd)

Effect of Multimedia Technology	UNIVERSITY LIBRARIES																														
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAD					
	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	TOTAL
Increases productivity and quality of information delivered	4(6.2	10(15.4	3(4.6	4(6.2	1(1.5	1(1.5	3(4.6	1(1.5	1(1.5	1(1.5	2(3.1	6(9.2	1(1.5	1(1.6	1(1.5	1(1.	5(7.7	2(3.1	1(1.5)	--	2(3.1)	3(4.6)	1(1.5)	--	1(1.5)	1(1.5)	5(4.60	1(1.5)	1(1.50	1(1.5)	65 (100).
It also helps in overcoming the barriers of boundaries proximity and physical capacity of a library to accommodate customers	4(6.2	10(15.4	3(4.6	4(6.2	1(1.5	1(1.5	3(4.6	1(1.5	1(1.5	1(1.5	2(3.1	6(9.2	1(1.5	1(1.6	1(1.5	1(1.	5(7.7	2(3.1	1(1.5)	--	2(3.1)	3(4.6)	1(1.5)	--	1(1.5)	1(1.5)	5(4.60	1(1.5)	1(1.50	1(1.5)	65(100)
It is an add-on service and secondary to other library services	4(6.2	10(15.4	3(4.6	4(6.2	1(1.5	1(1.5	3(4.6	1(1.5	1(1.5	1(1.5	2(3.1	6(9.2	1(1.5	1(1.6	1(1.5	1(1.	5(7.7	2(3.1	1(1.5)	--	2(3.1)	3(4.6)	1(1.5)	--	1(1.5)	1(1.5)	5(4.60	1(1.5)	1(1.50	1(1.5)	65(100)
It is an unnecessary expense	1(1.5.)	4(6.2)	3(4.6)	10(15.4)	4(6.2)	1(1.5)	1(1.5)	1(1.5)	3(4.6	1(1.5)	1(1.5)	1(1.5)	1(1.5)	6(9.2)	2(3.1	1(1.5)	1(1.5)	2(3.2)	5(4.6)	-	1(1.5)	-	1(1.5)	3(4.6)	2(3.2)	1(1.5)	1(1.5)	1(1.5)	5(4.6)	1(1.5)	65(100)

Effects of Multimedia Technology on Information Services

KEY: SA = Strongly Agreed, A=Agreed, D = Disagree, SD = Strongly Disagree,

U=Undecided.

The table 4.9a and 4.9b above .showed that 7 or 10.8% and 50 or 76.9% of the total respondents strongly agreed and agreed respectively that multimedia technologies help in satisfying different information needs such as reference, enrichment, entertainment and leisure. From the relatively low divergent opinion for the item in the Table, it could be said that this was the unanimous opinion of respondents from all the university libraries in the study area. The respondents agreed that multimedia technology application helps in meeting various types of information preferences of the customers such as scholarly, scientific, vocational, artistic and recreational needs. Multimedia exists in digital format thus information can also be assessed by remote users on a network which further diversify the effectiveness of the applications to others thereby overcoming the barriers of boundaries, proximity and physical capacity of a library to accommodate customers.

Other attributes of the multimedia technology application which made it to have positive effect on the information service delivery in the libraries agreed by the respondents in the table is that it is interesting and easy to use over the existing forms such as print, microforms and other analogue formats. Other advantages are the inherent nature of the technology. Being in integrated platform, multimedia application saves money, space and operational inconveniences. The respondents generally agreed with this opinion as shown by their percentages of agreement (strongly agree and agree) in the Table. Apart from these, the respondents agreed that multimedia application allow for making quick and spontaneous decisions, increases productivity and quality of information delivered. It also has the add-on service as appendages to other library services and help to avoid unnecessary expense. Thus, the use of multimedia technology application could be said to have positive effects on the information services delivery in the libraries.

4.3.10 Problems militating against multimedia technology applications to information Service Delivery in University Libraries in the Northern States of Nigeria

The identification of the constraints militating against multimedia application to information service delivery in the University libraries was assessed in Table 4.10. An attempt was made to differentiate the individual libraries as wells as the overall problems militating against the general use of multimedia technologies for information service delivery in the libraries.

Table 4.11 Factors Inhibiting the Use of Multimedia Technologies for Information Service Delivery in the University Libraries

Factors inhibiting multimedia technology use	UNIVERSITY LIBRARIES																													
	ABU					ATBU					BUK					FUTYM					UNIJOS					UNIMAD					
	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	SA	A	UD	D	SD	TOTAL
Poor support technology in the area of multimedia data and document storage and manipulation	4(6.2)	10(15.4)	3(4.6)	4(6.2)	1(1.5)	1(1.5)	3(4.6)	1(1.5)	1(1.5)	1(1.5	2(3.1)	6(9.2)	11(16.9)	1(1.5)	1(1.5)	1(1.5)	5(7.7)	2(3.2)	1(1.5)	- -	2(3.2)	3(4.6)	1(1.5)	-	1(1.5)	1(1.5)	5(7.7)	1(1.5)	1(1.5)	1(1.5)	65(100).
Converting all the multimedia resources into digital multimedia and storing is difficult (storage technology limitations)	4(6.2)	10(15.4)	3(4.6)	4(6.2)	1(1.5)	1(1.5)	3(4.6)	1(1.5)	1(1.5)	1(1.5	2(3.1)	6(9.2)	11(16.9)	1(1.5)	1(1.5)	1(1.5)	5(7.7)	2(3.2)	1(1.5)	- -	2(3.2)	3(4.6)	1(1.5)	-	1(1.5)	1(1.5)	5(7.7)	1(1.5)	1(1.5)	1(1.5)	65(100).
Lack of proper search and pattern recognition capability for locating information from multimedia databases	4(6.2)	10(15.4)	3(4.6)	4(6.2)	1(1.5)	1(1.5)	3(4.6)	1(1.5)	1(1.5)	1(1.5	2(3.1)	6(9.2)	11(16.9)	1(1.5)	1(1.5)	1(1.5)	5(7.7)	2(3.2)	1(1.5)	- -	2(3.2)	3(4.6)	1(1.5)	-	1(1.5)	1(1.5)	5(7.7)	1(1.5)	1(1.5)	1(1.5)	65(100).
A wide of range of multimedia software is not available to integrate, control, co-ordinate, manage and adapt different media for the latest human computer interfaces	4(6.2)	10(15.4)	3(4.6)	4(6.2)	1(1.5)	1(1.5)	3(4.6)	1(1.5)	1(1.5)	1(1.5	2(3.1)	6(9.2)	11(16.9)	1(1.5)	1(1.5)	1(1.5)	5(7.7)	2(3.2)	1(1.5)	- -	2(3.2)	3(4.6)	1(1.5)	-	1(1.5)	1(1.5)	5(7.7)	1(1.5)	1(1.5)	1(1.5)	65(100).

Factors Inhibiting the Use of Multimedia Technologies for Information Service Delivery in the University Libraries

All the respondents, 65 (100%) agreed that lack of proper search and pattern recognition capability causes delay in locating information from multimedia databases. in the libraries studied. Similarly, there was the problem of poor technological support in the area of multimedia storage and manipulation. This problem cut across the six universities and 65 (100%) of the respondents from all the universities agreed that they had this problem in the respective libraries. Closely related to the lack of support for the technologies was the problem of converting all the multimedia resources into digital multimedia and storing difficulties (storage technology limitations). All the libraries agreed this problem was militating against the application of multimedia technologies in their libraries.

There was also the problem of availability of necessary software, as indicated by the respondents in the table, a wide range of multimedia software was not available to integrate, control, co-ordinate, manage and adapt different media for the latest human computer interfaces. This problem cut across all the university libraries involved in the study. In the table above 65(100%) being the total number of respondents involved in the study agreed that this was a major constraint to the effective application of multimedia technology for the information service delivery in the university libraries studied. It can be argued from the above that there were many challenges facing the university libraries studied with regard to multimedia application to information service delivery. Thus the results of the study can be generalized that multimedia technology has very significant effect on information services delivery and that without it university libraries may not fully actualize their dreams of being efficient and effective agents of information service providers.

4.4 Test of Hypotheses

The hypotheses formulated to establish the statistical significance of the solution proffered for the research questions of the study were tested with a discussion in this section. The hypotheses were tested as follows;

Hypothesis I: The Multimedia technologies available and used in the University libraries in the Northern States in Nigeria have no significant effect on information service delivery.

This hypothesis was tested by computing the aggregate mean scores on multimedia application and the types of service delivery offered by the respective university libraries. The two variables were then correlated using the Pearson Product Moment correlation procedure. A summary of the test is presented in Table 4.4.2.

Table 4.12: Correlation Between Multimedia Use and Effectiveness of Service Delivery in the University Libraries

Variables	N	Mean	Std. Dev.	Std. Error	r-calc.	DF	P	r-critical
Multimedia use	65	3.72	1.867	0.232	0.573	63	0.000	0.244
Service delivery	65	22.17	3.761	0.466				

Figure 4.11 Correlation Between Multimedia Use and Effectiveness of Service Delivery in the University Libraries

The result revealed that the two variables were significantly correlated. The observed correlation coefficient for the test is 0.573 at 63 degree of freedom while the critical value is 0.244. The observed significant level is 0.000 ($P < 0.05$). Based on this, the null hypothesis that the Multimedia technologies available and used in the University libraries in the Northern States in Nigeria have no significant effect on information service delivery is therefore rejected. The result of the test revealed that the application of multimedia technologies significantly enhance

the effectiveness of information service delivery in the libraries hence better when compared to print delivery system.

Hypothesis II: The multimedia technologies being used for information service delivery in the University libraries in the Northern States in Nigeria have no significant effect on the library customers' satisfaction with the information services being provided.

The adequacy of the application of the multimedia technologies in the service delivery of the libraries assessed in Table 4.3.7 and 4.3.8 were used in the measurement of satisfaction with the applications. The aggregate means was computed and correlated with use of the multimedia in the libraries. The table was measured on a five point scale which qualified the use of the Pearson Product Moment correlation procedure used for the test. The result of the relationship between the two variables is summarized in Table 4.12.

Table 4.13: Correlation Between Application of Multimedia Technologies and Satisfaction with Information Service Delivery of the University Libraries

Variables	N	Mean	Std. Dev.	Std. Error	r-calc.	DF	P	r-critical
Satisfaction	65	2.85	0.541	0.067	0.176	63	0.160	0.244
Multimedia use	65	3.72	1.867	0.232				

Figure 4.12 Correlation Between Application of Multimedia Technologies and Satisfaction with Information Service Delivery of the University Libraries

The two variables were not significantly correlated. The observed correlation coefficient (0.176) is lower than the critical value of 0.244 at the 63 degree of freedom and the significant level (0.160) observed for the test is higher than the fixed level of 0.05 ($P > 0.05$). The null hypothesis that multimedia technologies being used for information service delivery in the University libraries in the Northern States in Nigeria have no significant effect on the library customers' satisfaction with the information services being provided is thus accepted. The implication of this

observation is that application of multimedia technologies in the information service delivery of the university libraries had not been adequate due to the militating problems against its use in the libraries. This means that information service delivery was not better performed and faster compared to manual operation.

Table 4.14: Mean Scores of the Libraries on the Adequacy of Multimedia Technology Applications to Information Service Delivery

University	N	Mean	Std. Deviation	Std. Error
ABU	22	2.7727	.57930	.12351
ATBU	7	2.6735	.47175	.17830
BUK	11	3.3117	.59528	.17948
FUT	9	2.8254	.36266	.12089
UJ	7	2.5510	.40765	.15408
UNIMAID	9	2.9048	.42258	.14086
Total	65	2.8549	.54133	.06714

Figure 4.13: Mean Scores of the Libraries on the Adequacy of Multimedia Technology Applications to Information Service Delivery

Table 4.13 has shown that all the libraries have almost the same mean score on the adequacy of the multimedia application for information service delivery. This accounted for the no significant observation in the test. As observed in the table, it implies that multimedia technologies' introduction to libraries was highly significant for information service delivery.

Hypothesis III There is no significant difference among the Universities libraries in the Northern states of Nigeria in the problems militating against multimedia technology applications to information service delivery.

This hypothesis was tested by converting the expressed opinions of the respondents in Table 4.9 into percentages to establish the scores on equal level and then applied the chi-square to the Table to determine possible significant differences in their opinions on the problems militating against the application of the multimedia technologies to the information service

delivery of the libraries. In Table 4.4.6, the expected count was printed below the observed frequency count.

Table 4.15: Chi-square Test on Problems Militating Against the Application of Multimedia Technology For the Information Service Delivery of the Libraries

Factors inhibiting the use of multimedia Technologies for Information Service Delivery	UNIVERSITY LIBRARIES					
	ABU	ATBU	BUK	F.U.T	U.J	UNIMAID
Poor support technology in the area of multimedia data and document storage and manipulation	100	86	100	100	86	100
	95.33	86.85	100.99	100.99	86.85	100.99
Converting all the multimedia resources into digital multimedia and storing is difficult (storage technology limitations)	100	86	100	100	86	100
	95.33	86.85	100.99	100.99	86.85	100.99
Lack of proper search and pattern recognition capability for locating information from multimedia databases	91	86	100	100	86	100
	93.83	85.48	99.40	99.40	85.48	99.40
A wide of range of multimedia software is not available to integrate, control, co-ordinate, manage and adapt different media for the latest human computer interfaces	95	86	100	100	86	100
	94.50	856.09	100.11	100.11	86.09	100.11
Chi-Square = 1.286, DF = 20, P-value = 0.999 (critical value =31.4)						

Figure 4.14: Chi-square Test on Problems Militating Against the Application of multimedia technology for the Information Service Delivery of the Libraries

The table did not reveal significant difference in the problems militating against the application of multimedia for information services delivery of the university libraries studied. The observed chi-square (1.286) is lower than the critical value (31.4) indicated in the table at the 20 degree of freedom. The observed significant level is 0.999 ($P > 0.05$). By these observations, the null hypothesis that there is no significant difference among the Universities libraries in the Northern states of Nigeria in the problems militating against multimedia technology applications to information service cannot be rejected.

REFERENCES

Sanni G.A. (2004). Library Computerization at the University of Benin. *Library Philosophy and Practice* 3(1)

Dahl M., et al (2006).*Digital Libraries: Integrating Content and System*.- London : Claude Publishing Ltd.

Oshinaike A.R. and Adekunmisi S.R.(2011) Use of Multimedia for Teaching in Nigerian University System: A Case Study of University of Ibadan. *Library Philosophy and Practice.5(2)*

Ubogu, F. N. (2006). *Trends in digital library services in academic libraries in South Africa: library profiles and ETD system.* Conference proceeding of the 44th Annual National Conference and AGM of Nigerian Library Association held at National Library of Nigeria Abuja, 2nd 4th Sept,15 pp. 18-2

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the investigation into the multimedia technology application to information service delivery in the university libraries in the Northern States of Nigeria. The chapter includes among others the conclusion, recommendations and suggestions for further study on the subject.

5.2 Summary of the Study

The objectives of university library among others, are to become relevant in information service delivery and to provide optimum level of services to reach more potential customers.. For the library to fulfill these objectives and remain relevant in a highly competitive and rapidly changing environment, they need to create and sustain competitive advantage in the provision of information resources and services. The traditional forms of information collection and management must be updated to accommodate innovations. Multimedia based information has become part of such innovations. The .dramatic changes in technology and society are having a considerable impact on university libraries and their instructional programs. These changes have created an urgency to teach library customers how to become more effective, efficient, and independent in their search for information. Any development in the twenty-first century depends to a great extent to which information is made available to the stakeholders. However, it has been observed that the application of multimedia technology to information service delivery seem not to be well articulated despite the preponderance of the technology in most university libraries in Nigeria. This study, therefore, investigated the multimedia technology application to information service delivery in the university libraries studied.

To accomplish the objectives of the study, a survey of the libraries in the six universities was conducted with a structured questionnaire designed by the researcher. The librarians from the six universities in the states were selected for the study. The cadre of librarians selected was done through the purposive sampling technique because the librarians involved in the multimedia technologies for information service delivery in the university libraries were the target population of the study. In all 81 questionnaires were administered out of which 65 were completely filled and returned making 80.2% of the total issued. The 65 constituted the total population used for the study. The data collected were subjected to a descriptive analysis using frequency and percentages tables for the demographic characteristics and the research questions of the study. The hypotheses were tested using the inferential statistics which included Chi-square, Pearson Product Moment Correlation procedure. A total of three null hypotheses were tested, one was rejected while two were accepted. A summary of the major findings from the analysis of the data and test of the hypotheses are presented below.

5.3. Summary of Major Findings

The major findings of the study were:

1 It was found that multimedia technologies were available in all the university libraries studied.

2 It was found that all the university libraries studied had streaming stored audio, streaming

stored video but none had live interactive video and audio.

3 All the university libraries studied used streaming stored audio, streaming

stored video but none used live interactive video and audio for information service delivery

4 Current awareness services, customer service, media service and reference services were used in all the university libraries studied.

5 All the university libraries studied observed that multimedia application had significant effect on information service delivery.

6 The university libraries studied revealed common problems militating against them in their application of multimedia technologies for information service delivery which included human and materials resources and the technical support required for effective application of the technologies.

5.4. Conclusion

Based on the findings of the study, it was concluded that the university libraries studied have realized the need for multimedia technology application to information service delivery in different forms. However, it was realized that there was no major difference in the type of multimedia technologies applied for information service delivery in the university libraries studied. The multimedia technologies available in the University libraries had significant effect on the information services delivered to customers. It was discovered that multimedia technologies were not adequately applied to information service delivery in the university libraries.

Despite the various limitations encountered by the university libraries, application of the multimedia technologies in information service delivery marks a significant turning point in the use of modern delivery process across different formats. From all indications university libraries in Nigeria may experience the greatest transformation it has ever undergone if multimedia technologies wais adequately applied.

5.5. Recommendations

Based on the findings of the study, the research recommends as follows:

1 There is urgent need to provide technological support in the area multimedia storage in university libraries

2 Search strategies for multimedia content should be enhanced for effective and efficient information service delivery in the university libraries.

3 Software for integration of multimedia content should be made available to university libraries

4 Multimedia applications should be provided in adequate number to enable easy and access to quality information in university libraries..

5 Regular and effective maintenance of hardware and software to keep them up-to-date is necessary for effective application of multimedia technologies.

5.6 Suggestions for Further Studies

This study focused on application of multimedia technology in University libraries of Northern Nigeria. The study could be replicated in other part of the federation towards establishing a common front for providing solution to the problem.

BIBLIOGRAPHY

Adekanye, E.A. (2011) Marketing of Information Resources in Selected Public Libraries in Lagos State: A Competitive Intelligence Approach. International Journal of Information Technology 89(1):49-59.

Aina, A.J & Adekanye E.A (2013) Audio-visual Resources Availability and Use For Library Services Among Colleges of Education in Lagos State Nigeria *International Journal of Library and Information Science* 5(10).

Agbalogun, A.(2013). Interactive digital technologies' use in Southwest Nigerian universities. *Educational Technology Research and Development,* 61I(2) pp 333-357

Agoulu C.C. and Agoulu I.E.(2002). " User Education in Nigerian Academic Library Libraries" *Libraries and Information Management in Nigeria. ED-LINFORM Services, Maiduguri,* p382

Akporhonor, B.A.(2005). Library Funding in Nigeria : Past, Present and Future. *The bottom Line: Managing Library Finances*, 18(2): 63-70

Alhamdani, D. (2008). Roles and Importance of Multimedia in Higher Education. In J. Luca & E Weippl (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008* (pp. 1215-1222). Chesapeake, VA: AACE. Retrieved July 17, 2014 from http://www.editlib.org/p/28540.

Ali, Y.S.(2013). Design and Implementation of Multimedia Content on Smartphone for Learning Automata Theory. Unpublished Thesis submitted to African university of science and Technology, Abuja.

Andrade, E ,Mercado, C and Reynoso J (2011) Learning Data Structures Using Multimedia Interactive Systems. *International Journal of Multimedia Applications.8 (3)*

Bell, J. (2007) Doing Your Research Experiment: A Handbook for First Time Research in Education and Social Science. London Open University Publishing Press

Bida, M.A.(2011). Information Resource Development and Utilization in the University Libraries of Northern Nigeria.*MLIS Unpublished Dissertation, Ahmadu Bello University, Zaria, Dept. of Library and Information Science.*

Bodnar, E. and Fones J (2009). *Library Collections 2.0: Managing Multimedia Technologies in Academic Libraries*. Presented at the Access Services Conference 2009, November 11 - 13, 2009, Georgia Institute of Technology, Georgia Tech Global Learning Center, Atlanta, Georgia

Bojkovic, Z (2007)."Multimedia Communication System: Modeling, Standardization, Requirements", in Proc. Int. Conference on multimedia technology and digital Telecommunication Services, ICOMPT'96, pp.5-13,Budapest, Hungary,

Chauhan, V(2004). Information Technology and Services .Retrieved on 12/3/2013 from http://vikaschauhan.brandyourself.com/

Chen, S. and Xia, Y. (2012). *Research on Application of Multimedia Technology in College Physical Education.* 2012 International Workshop on information and Electronics Engineering(IWEE). ProcediaEngineering29(4213-4217).

Cheung,E (2003). Multimedia Systems. *Multimedia Production and Web Authoring.* Accessed on 6/6/2014 from http??www.polyu.edu.hk

Clark, J.(2013). Developing a Digital Video Library with Youtube Data API *Code{4}lib* vol. 20 Accessed from wwww.journal.code4lib.org/articles/7847 on 19/02/2014

Cox, R.V. et al.,(2008) "On the Applications of Multimedia Processing to Communications", *Proceedings. of the IEEE*, vol.86, pp.755-824,

Crawford, W. (2006), "Library 2.0 and "Library 2.0"", *Cites And Insights*, 6 (2): 1-32, Accessed on 10/02/2014 at: http://citesandinsights.info/civ6i2.pdf.

Crawford, Walt (2009), "Making it Work: Library 2.0 revised", Cites And Insights, 9 (9): 25-32, Accessed on 10/02/2014 at: http://citesandinsights.info/civ9i9.pdf.

Crawford, W., (2011a), "Five Years Later: Library 2.0 and Balance", Cites and Insights, 11 (2): 1-26,accessed on 10/02/2014at: http://citesandinsights.info/civ11i2.pdf.

Crawford, Walt, (2011b), "Five years later: Library 2.0 and balance (cont.)", Cites and Insights, 11 (3): 1-22,accessed on 10/02/2014at: http://citesandinsights.info/civ11i3.pdf.

Dahl M., et al (2006).*Digital libraries: Intergrating Content and System*.- London : Claude Publishing Ltd.

Depoy &Gitlin (2005). *Introduction To Research: Understanding Multiple Strategies.* St Louis Elservier, 2005

Doty, D. E., Popplewell, S. R., & Byers, G. O. (2001). Interactive CD-ROM Storybooks And Young Readers' Reading Comprehension. *Journal of Research on Computing in Education*, 33(4) 374-384.

Fatoki, O.C. (2005). Prospects of GSM Technology for Academic Library Services.*The Electronic Library* 23(3); 266-273

Ganglier, T(2011). *Semantic Federation of Musical and Music Related Information For establishing Personal Music Knowledge-Base.*A Diploma Thesis of the Technische Universitat Dresden, Dept. of Computer Science, Institute for Systems Architecture, Chair of Computer Networks.

Ganiyu, M.A. &Akinreti, Q. (2011).*Secrets of Online and Multimedia Journalism: A Manual for Online and Multimedia Journalism Practice in Africa*. Ibadan: Emgee Publishing Limited.

Gay, J.R.()1976). Educational Research Competencies for Analysis and Applications. London: Merill Publishing company

Gbaje, E.S. (2007). Provision of Online Information services in Nigerian Academic Libraries. Nigerian Libraries: *Journal of Nigerian Library Association* 40. p.1

Gerolomos, M and Konsta, R(2011). Services for Academic libraries in the New Era. *D-lib Magazine* vol.17 (7/8).

Godia, K. (2007). *Access And The Changing trends in Libraries*.-Delhi: Adhyayan Publishers and Distributors.

Gupta, S. (1996).Impact of information technology on library management techniques and staffing structure. In: Human Relations in Librarianship. Seminar Papers of XLI All India Conference held on January 7-10, 1996 in Vijayawada, 1996, pp. 336-343.

IFLA(2004). *Libraries: Tools For Education and Development.* Retrieved from http//archives.ifla.org/iv/ifla70/ on 16/4/2014

Jumping, Su, et. al (2008). The Application of Multimedia in Academic Library. Proceedings of the International Conference on Multimedia and Information technology Held at Three Georges, China.

Kalipsiz, O. (2000). Multimedia databases. *Proceedings of IEEE International Conference,* 111-115. Retrieved, May4,2009,from: http://ieeexplore.ieee.org.proxy.library.msstate.edu/

Kanamadi and Kumbar (2006)Web-Based Services Expected from Libraries: A Case Study of Management Institutes in Mumbai City.*Webology*,3()2

Karim,S.N, Darus S.H. and Hussin, R (2012). Mobile Phone Application Services in Academic Libraries: A students Feedback Survey. Retrieved March 5th from www.emeraldinsight.com/1065-0741.htm

Kerlinger, F.N. (1973). *Fundamentals of Behavioral Research*. New York: Hall Reinhart.

Koumi, J. (2003). Synergy Between Audio Commentary And Visuals in Multimedia Packages. *Journal of Educational Media*,28(1), 19-34.

Luvhua, T.(2011). Multimedia Application Research in Sport Education. *Procedia Engineering, Elsevier Ltd Selection and peer-review under responsibility of ceis.*

MacArthur, C. A., & Haynes, J. B. (1995). Student Assistant for Learning from Text (SALT): A hypermedia reading aid. *Journal of Learning Disabilities*, 28, 150-159.

Madhusudhan, M and Namabhushanam, V.(2012). Use of Web-based Library and Information Services in India: A Study. *International Journal of Library and Information Studies.*20(4) .

Martey, K et al (2004) The Effectiveness of Multimedia for Library-User Education: Final Report of the LUMENS Project Accessed on 11/04/2014 from http://www-personal.si.umich.edu/~ylime/lumens/lumensFinal.pdfl.

Mayer R. *et. al. (*2002). Aids to Computer –based Multimedia. In Learning and Instruction 12:107-119

Mayer, R(2003) Multimedia Learning in an Interactive Self-Explaining Environment: What Works in the Design of Agent-Based Microworlds?95(4):pp808-816

Mayer, R(2005). *The Cambridge Handbook of Multimedia Learning.* New York: Cambridge University Press

Mitchell, (2014)VHS, DVDs, Streaming Videos, and Audiobooks. Retrieved on 7/8/2013 from http://libraryguides.mtsu.edu/content.php?pid=604809&sid=4990554

Mohammed, Z.(2003). Contemporary Trends and Status of Development in Library and Information Systems and Services in Nigeria. A paper Presented at the Workshop for Feasibility Study on Development of Virtual Library for Nigeria Held at the NTI Conference Centre, Kaduna, 23rd-25th August

Moore-Hart, M. A. (1995). The Effects of Multicultural Links on Reading and Writing Performance and Cultural Awareness Of Fourth and Fifth Graders.*Computers in Human Behavior*, 11(3-4), 391-410.

National Center for Education Statistics. (2002). *Internet Access in Public Schools,1994-2001*. Retrieved June 5, 2011, from http://nces.ed.gov/pubsearch /pubsinfo.asp?pubid

Ndakotsu, J.J. (2006). Effectiveness of Vocational and Technical Education for Development in Niger State. *Unpublished PhD Thesis, Bayero University, Kano.*

Neuhold E and Niederee (2013). Multimedia Libraries - Role of DigitalLibraries in Content-to-Community Mediation, Metadata and Search Services Retrievedon 14/04/2014

Newton, L.R., & Rogers, L. (2001 *Teaching science with ICT*. London: Continuum. *Nigerian Tertiary Education-universities, polytechnics, and Colleges of Education*(2012).retrieved on04/122012 from http://www.lawnigeria.com/laweducation/universities/polytecniques/cegesofeducation

Nkanu, W. O. and Okive, H.I. (2010). Digital Divide: Bridging the Gap through ICT in Nigerian Libraries. *Library Philosophy and Practice.*

Oberhauser, O.(2011).Interactive Multimedia in Library and Information Services. *Audio-Visual Librari*an 27(1)

Ogunbote, K.O. and Adesoye, A.E. (2006). Quality assurance in Nigerian academic libraries networked multimedia services. *Journal of Library and Information Science,* Vol. 3. No. 1 & 2 pp. 100-111.

Ogunlana, E. F.(2012). Perceived Use of Networked Multimedia Applications on Learning in Selected Universities in South West Nigeria. Library *Philosophy and Practice*.

Omagbemi, C.O., Akinola, B.A. and Olayiwola I.B. (2004). Academic libraries, the Internet and its potential impact on teaching and learning in Nigerian tertiary institutions. *Journal of Library and Information Science,* 1 (1 & 2), pp. 34-46.

Omotosho, A.(2001). *Statistics*._ Ibadan : N P S Educational Publishers Ltd.

Oshinaike A.R. and Adekunmisi S.R.(2011) Use of Multimedia for Teaching in Nigerian University System: A Case Study of University of Ibadan. *Library Philosophy and Practice.*

Osuala, E.C. (2000). *Introduction to Research Methodology._3rd ed*. Onitsha:Africana Publishers Ltd.

Ou, C. & Zhang, K. (2006). Teaching with database: Begin with the Internet. *Tech Trends,* 50(5), 46-51.

Pace, A. (2003).Virtual Reference: What's in a Name?. *Computers in Libraries**23** (4): 55–56.*

Salina (2010).*Role of Multimedia in Education*. Retrieved on 28/112012 from http://www.slideshare.net/salina

Siddiqui, M. H. (2008). *Challenges of Educational Technology*. Delhi: Balaji Press.

Sierra-Fernandez, J. L., & Perales-Palacios, F. J. (2003).The effect of instruction with computer simulation as a research tool on open-ended problem-solving in a Spanish classroom of

16-year-olds.*Journal of Computers in Mathematics and Science Teaching*, 22(2), 119-140.akum

Schnotz, W., & Bannert, M. (2003). Construction and interference in Learning from Multiple Representation. *Learning and Instruction*, 13, 141-156.

Schnotz, W. & Kürschner, C. (2007). A Reconsideration of Cognitive Load Theory. *Educational Psychology Review*, 19,

Ramaiah, C. K.(2008) Multimedia Systems in Libraries and their Applications *DESIDOC Bulletin o Information Technology, Vol.* 18, *No 6*, pp. *25-40.*

Rao,Y.S. and Coughury, B.K.(2010). Networked Services in the NIT Libraries in Zone wise *Library Collections, Acquisitions & Technical Services*34.

Roblyer, M. D., & Schwier, R. A. (2003).Integrating Educational Technology into Teaching. Toronto: Pearson Education Canada Inc. *The International Journal of Multimedia & Its Applications (IJMA)*.3(1).

Rosenberg, J et al.,(2002) Multimedia Communications For users ,*IEEE Comm. Magazine*, vol.30, pp.20-36.

Top 100 Universities in Nigeria and their Ranking(2014). Retrieved from http://www.naijagist.com on 10/12/2012

Umar, L.(2010) Application OF Customer Relationship Management (CRM) in Information Service Delivery in University Libraries in North Western states of Nigeria. *An unpublished Thesis submitted to the Department of Library and Information Science, Ahmadu Bello University, Zaria*

Unagha, A..O. (2009). Nigerian University Libraries and Challenges of User Service Demand of the 21st Century:What University Administrators Should Know. *South African Journal of Library and Information Science*, 75(2)

Vanankamudi, V and Padma, P (2014).Multimedia Application in Digital Environment of College Libraries. *Shanlax International Journal of Arts, Science and Humanities 1(3)*

Viko Library Solution(2012). Libraries and Multimedia Technology: Future Trends and Applications in Higher Education. Retrieved on 26/12/13 from http://www.viko-security.com/libraries-and-multimedia-technologyfuture-trends-and-applications-in-higher-education/.

Wang, Y. & Lin, C. (2004). A Multimedia Database Supports English Distance Learning. *Informartion Science*, 158, 189-208.

What are information services? (2009) Retrieved from http://www.olc.org on 20/12/2012

Windschitl, M. (2000).Using the WWW for teaching and learning in classrooms: What are the interesting research questions? *Cyber Psychology& Behavior*, 3(1),89-96.

Wolf, L. C. Griwadz, C & Steinmetz, R. "Multimedia communication", *Proc. of the IEEE*, vol.85, pp.1915-1933.

Woodsworth, A and Williams, J.F.(2012). Managing the Economies of Owning, Leasing and contracting out Information Services Aldershot, Hunt: Ashgate Publishing Limited.

Yu, C and Brandenberg, T. (2011) Multimedia Database Applications: Issues and Concerns For Classroom Teaching. *The International Journal of Multimedia & Its Applications (IJMA)* 3 (1).

Yu, C., Williams, A., Lin, C. F., & Yu, W. C. (2008).*Planning Effective Multimedia Instruction.* In Terry T. Kidd & Holim Song (Eds.), Instructional systems and technology 1 Hershey, PA: Information Science Reference. pp 216-231

Zhuang (2005) Digital libraries: A test bed For Multimedia Technology Journal of Zhejiang, University of science 6A(11):1202-1203

APPENDIX

QUESTIONNAIRE FOR PROFESSIONAL LIBARRY STAFF

"Multimedia Technology Application to Information Service Delivery in the un university libraries in the Northern States of Nigeria"

Questionnaire:

Please read each statement in the questionnaire carefully and provide a candid response. Your response will be an immense contribution to this study.

Thank you.

J. A. Ikwe

Researcher

General information

Please indicate your opinion on each criterion according to how much you agree or disagree with each statement by circling/ ticking the appropriate response on the right side of each question.

SA -strongly Agree

A -Agree

U - Uncertain

D -Disagree

SD –Strongly Disagree

Section A: Personal Data

1 Name of Institution ----------

2 Division/ Department ----------

3 Gender: (a) Male [ ] (b) Female [ ]

4 Age: Tick the appropriate age range (a) 20-29 years[ ], (b) 30-39 years [] (c) 40-49 years[ ] and (d) 50 years and above[ ].

5 Marital status: (a) Married [ ] (b) single [ ]

6 Years of Experience (a) 1-5 years [ ], (b), 6-10 years [ ], (c) 11-15 years [ ], (d) 16-20 years [ ], (e) 20 years and above [ ]

7 What is your highest educational qualification

(a) O' level [ ]

(b) OND [ ]

(c) HND [ ]

(d) DLS [ ]

(e) BLS [ ]

(f) MLS [ ]

(g) PHD [ ]

8 Department/Division where you work within the library

Media [ ]

Resource Development (Collection Development) [ ]

Resource processing (Cataloguing) [ ]

Human Resource Development [ ]

ICT Division [ ]

Reference Division [ ]

Customer Service [ ]

Research and bibliographic service division [ ]

Others (please specify)

9 Level of computer literacy (a) Very High [ ], (b) High [ ] (c) Average [ ] (d) Low [ ]

SECTION B: Availability of Multimedia Technology Applications to Information Service Delivery

10 Which of the following types of multimedia technologies are available for information service delivery in your library?

(a) Streaming stored audio [ ]

(b) Streaming stored video [ ]

© Streaming live audio [ ]

(d) Streaming live video [ ]

(e) Live interactive audio [ ]

(f) Live interactive video [ ]

(d) Others (Please specify)----------

SECTION C: Types of multimedia technology application used for Information Service Delivery

11 Indicate the types of multimedia technology application used for information service delivery in your library

(a) Streaming stored audio [ ]

(b) Streaming stored video [ ]

© Streaming live audio [ ]

(d) Streaming live video [ ]

(e) Live interactive audio [ ]

(f) Live interactive video [ ]

(d) Others (Please specify)----------

12 To what extent are multimedia technology applications applied to information service delivery in your library?

S/N	Statement	Highly Applied	Applied	Rarely Applied	Not Applied	Undecided
A	Streaming stored audio					
B	Streaming stored video					
C	Streaming Live audio					
D	Streaming live video					
E	Live interactive audio					
F	Live interactive video					
G	Others(please specify)					

SECTION D: Types of Information Services provided using Multimedia Application

13 Indicate the types of Information service for which multimedia technology applications are used in your library

(a) Reference Services [ ]

(b) Current Awareness services [ ]

(c) Customer Relations services [ ]

(c) User Education services [ ]

(d) Information Literacy services [ ]

(e) Audio Visual services [ ]

(p) Others (please specify) [ ]

SECTION D: Effect of Multimedia Application To Information Service Delivery

Instructions: Please tick the correct response to the items in this section on a 1-5 rating scale. 1. Strongly Agree, 2. Agree, 3. Undecided, 4. Strongly Disagree, 5. Disagree

14 Indicate your response with regard to how multimedia technology applications affect information service delivery in your library.

S/N	Statement	1	2	3	4	5
A	Multimedia technology applications helps in satisfying different information needs such as reference, enrichment, entertainment, leisure, etc .					
B	Multimedia technology applications helps in meeting various types of information preferences of the customers, such as scholarly, scientific, vocational, ‘artistic, recreational,					
C	Being in digital format, information can also be accessed by remote users on a network.					
D	It also helps in overcoming the barriers of boundaries, proximity and physical capacity of a library to accommodate customers.					

E	It is interesting and easy to use over the existing form such as print, microforms, and other analogue formats					
F	Being in integrated platform multimedia applications saves on money, space and operational inconveniences.					
G	Allow for making quick and spontaneous decision					
H	Increases productivity and quality of information delivered					
I	It is an add-on service and secondary to other library service					
J	It is an unnecessary expense					

SECTION E: How multimedia Technology is Applied to Information Service Delivery

15 Indicate through which of the specific type of applications is multimedia technology applied for information service delivery in your library?

(a) Tutorial programs on information access in the areas of citation searching, online searching, how to use Boolean operators, and how to decipher bibliographic citation, etc [ ]

(b) Reference tools, e.g. Multimedia encyclopedias, directories, almanacs etc, [ ]

(c) Technical documentation, including engineering drawings, specifications, etc. [ ]

(d) OPAC Tutorials [ ]

(d) Documentaries [ ]

(e) Feature films [ ]

(g) Power Point presentations [ ]

(f) Others (please specify) [ ]

SECTION F: Adequacy of Multimedia Applications for Information service delivery

16 . How adequate are the following multimedia technologies applied to information services delivery in your library?

S/N	Statement	Very Adequate	Adequate	Fairly Adequate	Inadequate	Undecided
A	Streaming stored audio					
B	Streaming stored video					
C	Streaming Live audio					
D	Streaming live video					
E	Live interactive audio					
F	Live interactive video					
G	Others(please specify)					

SECTION Factors inhibiting the use of multimedia Technologies for Information Service Delivery.

17 Indicate the factors inhibiting the use of multimedia Technologies to information service delivery in your library?

(a) Lack of trained manpower for the development and management of multimedia databases [ ]

(b) Poor support technology in the area of multimedia data and document storage and manipulation. [ ]

(c) Converting all the multimedia resources into digital multimedia and storing is difficult (storage technology limitations) [ ]

(d) Lack of proper search and pattern recognition capability for locating information from multimedia databases. [ ]

(e) A wide range of multimedia software is not available to integrate, control, coordinate, manage and adapt different media for the latest human computer interfaces. [ ]

18. Suggestions on multimedia application to information service delivery in your library.

i. _____

ii. _____

iii. _____

iv. _____

v. _____