WEB-SEARCHING BEHAVIOUR, MOBILE TECHNOLOGY AND LIBRARY INFORMATION RESOURCES USE AS PREDICTORS OF ACADEMIC PERFORMANCE OF LIBRARY AND INFORMATION SCIENCE UNDERGRADUATES IN NIGERIA

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CERTIFICATION

I certify that this work was carried out by **OMOBOLADE OPEYEMI ADEAGBO (**Matric Number 141862) in the Department of Library, Archival and Information Studies, Faculty of Education, University of Ibadan.

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DEDICATION

This PhD work is dedicated to the Father, Son and the Holy Spirit for the enablement I received to finish the programme, my husband, my children, and to the memory of my late brother, Iyanuoluwa Akinropo Akinosun. You live on in our hearts.

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ABSTRACT

Academic performance is the extent to which students attain their educational objectives, goals, and outcomes. However, studies have shown that academic performance of Library and Information Science (LIS) undergraduates in most universities in Nigeria is poor. Previous studies have investigated the influence of undergraduates' characteristics, school and home factors on academic performance with little attention to web-searching behaviour, mobile technology and library information resources use. This study, therefore, was carried out to examine Web-Searching Behaviour (WSB), Mobile Technology Use (MTU) and Library Information Resources Use (LIRU) on Academic Performance (AP) of LIS undergraduates in Nigerian universities.

The Educational Productivity and Constructivist theories, and Ellis' Model of Information-seeking Behaviour provided the framework, while the survey design was used. The multi-stage sampling procedure was adopted. Six federal universities: Abubakar Tafawa Balewa University, Bauchi; Ahmadu Bello University, Zaria; University of Calabar, Calabar; University of Ibadan, Ibadan; University of Ilorin, Ilorin; and, University of Nigeria, Nsukka; five state universities: Ambrose Ali University, Ekpoma; Imo State University, Owerri; Kwara State University, Malete; Tai Solarin University of Education, Ijebu-Ode; and, Umaru Musa Ya'adua University, Katsina and three private universities: Adeleke University, Ede; Benson Idahosa University, Benin City; and, Madonna University, Okija offering LIS degree programme were purposively selected. The proportional to size sampling technique was used to select 40% of the LIS undergraduates across the universities. The instruments used were WSB ($\alpha = 0.92$), MTU ($\alpha = 0.77$), LIRU ($\alpha = 0.96$) scales and the academic records of LIS undergraduates. Data were analysed using descriptive statistics, Pearson's product moment correlation and Multiple regression at 0.05 level of significance.

The LIS undergraduates' age was 21.00±1.30 years, and 52.8% were females, while their level of the academic performance was low (46.8%). Six percent of the undergraduates searched the web frequently for academic activities. Google search engine (85.7%) and Mozilla web browser (85.7%) were commonly used, while behavioural strategy (54.6%) and chaining process (68.2%) were mostly displayed. Laptop (86.1%) and smartphone (84.5%) were the most frequently used mobile technology, while Google drive (62.3%) and vocabulary builders (56.3%) were the main mobile applications. Almost all the undergraduates (99.9%) visited the library at least once a week and 85.7% use special print collections or newspapers, while 16.7% rarely used electronic resources. The WSB ($r = 0.09$) and LIRU ($r = 0.07$) had relationships with AP, while MTU did not. The WSB, MTU and LIRU had joint contributions to AP ($F_{(3;1246)} = 6.89$, Adj. $R^2 = 0.17$), accounting for 17.0% of its variance. The WSB ($\beta = 0.10$), LIRU ($\beta = 0.11$) and MTU ($\beta = 0.03$) relatively contributed to AP.

Web searching behaviour and library information resources use enhanced the academic performance of library and information science undergraduates in Nigeria. These factors should be considered by lecturers, library administrators and policy-makers for improved academic performance of library and information science undergraduates.

Keywords: information-searching strategy, information-seeking process, information resources use, academic performance of library and information science undergraduates.

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CHAPTER ONE
INTRODUCTION

1.1 Background to the study

Universities are designed to develop lifelong learners, create encouraging learning and teaching environment for imparting skills, behaviour, and attitude prerequisite for relevant professional posts in government parastatals, business organisations and industries. They are established to teach and carry out research to convey knowledge, skills and competencies as well as produce graduates who are well equipped to pursue service to the community and compete favourably in the international market (National Universities Commission (NUC), 2014). Universities are to come up with learning outcomes, evaluation of the fulfilment of the outcomes as well as engaging the students in a process for continuous improvement over the years to meet the outcomes (Oakleaf, 2011). The Benchmark Minimum Academic Standards (BMAS) document clearly stated that the philosophy of universities generally is to produce quality high academic graduates endowed with ethical standards and practical exposure for self or industry employment and become an asset to the nation (NUC, 2018).

Furthermore, the impact of ICT in the educational settings has advanced knowledge in all the academic disciplines and this necessitated new sets of skills required by students. In 2018, NUC reiterated its commitment to comprehensively review the BMAS documents used by Nigerian universities, to update the standard and make the documents more responsive to the demands of the labour market (NUC, 2018). Therefore, the stipulated learning outcome by the BMAS document is for educational programmes like LIS education, to equip students with adequate competences and skills in their area of specialisation. On this premise, the Librarians' Registration Council of Nigeria (LRCN, 2017) advocated for the incorporation of more ICT and other appropriate courses into the LIS undergraduate programme. Corroborating this initiative, Ismail, Mahmood, and Abdelmabouda (2018) reported that the utilisation of

the Internet and the web as classroom technology significantly impacted the academic performance of undergraduates as they use it to learn, communicate and entertain.

Students constitute an essential asset of any university, and the anticipation is that undergraduates will develop skills, attitude and acquire knowledge while in the university. Library and Information Science (LIS) is an interdisciplinary and a multidisciplinary programme that applies theories and technologies to create, select, organise, manage, preserve, disseminate, and utilise information in various formats (Reitz, 2004). Since libraries are to provide information for the progress of a nation, LIS programmes expose undergraduates to training in library and information science, information and communication technology (ICT), and also, information management courses. LIS education produces library and information professionals equipped with intellectual capacities to work in financial institutions, industries, libraries and become useful members of the society. Hurst-Wahl (2010) avers that LIS undergraduates are full of energy, ideas and believe in the power of information; thus, LIS undergraduates are expected to have the ability to assimilate information and concepts. They are to understand the role of emerging technologies in handling information.

Moreover, features that distinguish a modern society are information and knowledge, the primary driver being ICT. In this generation, ICT has become a significant component of the educational system. In realisation of this fact, the Federal Government of Nigeria put in place plans to establish universities offering ICT courses in the six geopolitical zones of the nation (Federal Ministry of Communication Technology, 2016). This initiative was to provide opportunities that will close the difference in the technology level causing digital divide between rural and urban dwellers due to lack of infrastructure and also strengthen the awareness of students by ensuring that they embrace ICT. Thus, highly skilled graduates, who can compete globally and trained youths that can educate others, could be produced through this initiative (Elebeke, 2016).

ICT is central to education. Many of the activities like teaching, learning, research, scholarship and administration in the educational setting are becoming dependent on ICT. For example, Internet use in education enhances information seeking and searching, using the web and interaction with search engines known as web-searching behaviour. It involves information sharing through various technology platforms used on mobile devices, accessing information resources easily, and collaboration among undergraduates, academics and institutions. Instructive utilisation

of ICT has, therefore, brought about new types of pedagogy which include information sharing and collaboration among undergraduates, lecturers and institutions, provision for online/distance learning among others (Sife, 2013). The emerging technologies have brought about a paradigm shift in contemporary information services delivery, making it necessary for information professionals to adjust to meet the challenges posed.

Moreover, LIS, as a discipline embraces the revolution brought about by ICT because of its usefulness in the education and training of undergraduates. LIS discipline is pivotal to all other disciplines that are knowledge and information-based. The undergraduates are learning to be information professionals and are being trained to provide information and guidance to every other discipline. Information professionals form a bridge between information and people, thus providing links to other disciplines. As future information professionals, therefore, LIS undergraduates must be above average academically and should be able to fit into all works relating to LIS profession by possessing dexterity in the use of the emerging technologies and information resources.

LIS undergraduates are expected to be furnished with techniques, practical skills and appropriate theoretical knowledge needed to build and improve work performance while in library schools (LRCN, 2017). Therefore, like other undergraduates, they engage in standard structured lectures, assignments, group discussions, seminars, writing term papers, continuous assessments, and examinations. They are taught to collect, organise, preserve and disseminate information resources. All these are used in the evaluation of their overall performance culminating in academic success. Thus, academic performance is crucial to the overall success of the LIS undergraduates, just like undergraduates in all other disciplines.

Academic performance could be defined as the extent to which undergraduates obtain their educational objectives, goals, and outcomes. These include performance measured regarding practical examinations, continuous assessments and assessment of essays, practical exercises, and reports. Usually, the grade point average (GPA) is used to express the academic performance of undergraduates. That is, the overall performance of each undergraduate in an academic programme is determined by the mean of marks obtained from courses offered after the programme terminates (Richardson, Abraham, and Bond, 2012). Several assessment instruments/measuring scales have been used in universities to express the overall performance of undergraduates since the inception of the course unit system. However, the Cumulative Grade Point Average (CGPA) is the

key assessment instrument used in the course unit system (CUS) of university education. The CUS is a system in which academic programmes are designed with courses which are weighted and classified into various levels for undergraduates (Ajadi, 2015). Academic performance is highly relevant to undergraduates as it determines their year of graduation, career after education and path towards postgraduate programmes based on the class of degree obtained. Moreover, the academic performance of undergraduates influences the socioeconomic advancement of a nation.

Generally, there are observations that the academic performance of undergraduates in Nigeria is declining. Onyase (2014) and Olufemi, Adediran and Oyediran (2018) observed that most of the graduates from universities in Nigeria in recent times are no longer at par with their international colleagues going by the quality of services rendered after graduation. In 2019, Daily Trust reported on the 127,023 graduates for 2018/2019 academic session from 36 universities in Nigeria out of which only 1.8% had 1st Class degree. This is of great concern because an established strong association exist between academic performance and the economy of a nation (Organisation for Economic Co-operation and Development (OECD), 2018; Okedigba, Adedigba and Okedigba. 2019).

Zakariya and Bamidele (2015) ascribed low academic performance to factors like poor infrastructure, academic weakness and emotional problems among others while high academic performance is associated with factors such as excellent teaching and learning processes, learning infrastructure, peers influence, and parents' financial level. Olusola, Omoregie, Emmanuel and Olushola (2016) noted that the academic performance of Nigerian undergraduates is of great concerns and necessitate interventions to evaluate the factors that could enhance the academic performance of the undergraduates in various disciplines.

Giving the importance of academic performance, scholars over the years have sought to understand factors outside ICT that influence it. The assessment of individual differences rather than just past achievement and cognitive capacity has been reported to predict academic performance more accurately (Richardson, Abraham and Bond, 2012). These individual differences include intelligence, personality traits, and interest that might determine the way undergraduates search for information and any available means to enhance their academic success. A study undertaken by Ali, Haider, Minur, Khan and Ahmed (2013) in Pakistan revealed that age, parental socioeconomic status, and study hours, meaningfully influenced the academic performance of undergraduates.

Academic performance is found to have a strong correlation with positive socioeconomic development (Steinmayr, Meißner, Weidinger and Wirthwein, 2017).

Similarly in Nigeria, academic performance was related to students', school and teachers' factors and parental financial status of Nigerian undergraduates among others and the results showed that these factors greatly influenced academic performance (Olufemi, Adediran and Oyediran, 2018). Admission policy, disruption of academic calendar, students' concentration, reading habit and class size were also stated to impact the academic performance of Nigerian undergraduates significantly (Akintoye and Uhunmwuangho, 2018; Orike, 2019). Okoedion, Okolie, and Udom (2019) study however revealed that home, institutional, lecturer and students' factors jointly contributed to the declining academic performance of Nigerian undergraduates.

The enormous and increasing quantity of available and easily accessible information through the Internet has given undergraduates opportunities to improve their academic performance. Advancements in technology have provided an atmosphere that encourages knowledge sharing, thus, making learning much more comfortable. The disposition of undergraduates to the use of these technological innovations could influence the use for academic activities and invariably positively impacted their academic performance. In the light of this, ICT could impact the academic performance of undergraduates negatively, but with proper multitasking and guidance, it could influence the academic performance of the undergraduates positively (Maqableh, Rajab, Quteshat, Masa'deh, Khatib and Karajeh, 2015).

University communities widely accept Internet technology where the web through the Internet, is a platform for undergraduates to acquire information. Generally, undergraduates have a positive disposition towards the Internet and find enjoyment in using it for academic and personal purposes. The web has turned into a vital piece of undergraduates' lives as an essential source of information. Web-based learning is progressively being advanced and executed in educational settings requiring undergraduates to search the Internet for information (Tsai, 2009). Undergraduates often need to search for information online to turn in assignments, term papers, and project work. Thereby, they fulfil their information needs by using the web daily. However, undergraduates are faced with some difficulties when they search the web for information. Some of the noted problems faced by undergraduates while searching for information were disorientation, inability to evaluate web-based resources and specify search terms, among others. Thus, the need to understand the web-searching behaviours

of undergraduates to develop adequate web-searching skills which should assist in the identification, evaluation and effective use of online information (Civilcharran, Hughes and Maharaj 2015).

Web-searching behaviour, according to Kinley (2013:p. 12), refers to "information searching and seeking on the web that requires the user to interact with web search engines to retrieve information". Information seeking processes required in a search include chaining, differentiating, monitoring, browsing, extracting and verifying activities. A search must have a starting and an ending point, but the activities may not occur in chronological order. On the other hand, information searching strategies on the web include essential skills and approaches required for Internet manipulation which are found in three main domains, that is, behavioural, procedural and metacognitive (Tsai and Tsai, 2003). Behavioural domain described search strategies aspects like control and disorientation essential to navigate the Internet while conducting a basic search. The procedural domain has to do with all-purpose strategies used for content-search on the web like problem-solving and trial and error while metacognitive domain indicates "higher-order" and "content-related" skills used for cognitive activities related search on the web such as selecting main ideas, purposeful thinking and evaluation.

Observation shows that undergraduates are capable of playing with technology, but are not necessarily using it efficiently for academic purposes. Undergraduates can search on Google but come up short of the necessary searching skills, strategies, and tactics to locate the information they need effectively. They have inadequate knowledge and skills to effectively establish the relevance or to verify the authenticity of information accessed. Krubu and Zinn (2018) attested that inability to formulate search strategies, chose the right keywords, subject headings or databases are some of the intellectual barriers undergraduates face when searching the web for information. As a result, there are concerns about how undergraduates surf the internet for information and how instructors can guide the abilities of undergraduates to effectively utilise search strategies. For these reasons, research on web-searching behaviour is centring on how the Internet, social media and mobile technology use are changing the way undergraduates seek information (Spezi, 2016).

Thus, the need for information has made mobile technology, another technological innovation, to have a profound impact on the academic communities. Mobile technology is a platform designed for and used on mobile devices. Conole, de

Laat, Darby and Dillon (2008) indicated that undergraduates broadly utilise personally owned mobile technologies, which include personal computers, laptops and a variety of mobile devices. These mobile devices, according to Beal (2015) and TechTarget (2016), also include personal digital assistant (PDA or pocket computer), smartphones and tablet pocket computer (Tablet PC). Wylie (2016) had earlier noted that eBook readers, iPads, netbooks, iPods, cell phones, and PDAs in general are gradually getting to be the choice tools in the modern educational system. Mobile devices have inbuilt Wi-Fi for accessing the Internet and information resources on the web, and the ability to tap into thousands of mobile educational applications (apps) available on the Internet. The mobile applications (apps) software are specially developed for mobile devices. Some of these apps include dictionary.com, Microsoft office mobile, google drive, skype, Coursera, vocabulary builder and Dropbox, among others.

Majority of undergraduates and lecturers are taking the advantage offered by the new technology. Mobile technology is more than just an essential accessory. It is a ubiquitous device for interactive media, information and data gathering and processing. In the United States of America, it was reported that after the laptop, smartphones and tablets were the second most popularly used mobile devices utilised by 81% of undergraduates to study, with an increase in the annual use by 40% (McGraw-Hill Education and Hanover Research, 2015). Therefore, asking undergraduates to utilise the mobile technologies on their personal mobile devices to improve their learning activities is in tandem with modern learning methods which encourage independent activities that build knowledge.

Mobile technology use could add value to the academic activities of undergraduates and thus increase the quality of their academic performance (Lepp, Barkley and Karpinski, 2015). For instance, undergraduates often have access to open educational resources and educational-enhancing capabilities through smartphones just like Internet-connected computers. They can share files, retrieve information and interact with lecturers and other students. Undergraduates use mobile technology because it provides quick access to short but highly relevant information. It was found to be less expensive, quicker, dependable and valuable source of current and relevant information for continuous assessments, projects and research work (Sofowora, 2011).

There is evidence that mobile technology use enhances the academic performance of undergraduates when used appropriately. A University of Texas, El Paso (UTEP, 2013) study showed that the grades of undergraduates who used an iPad for

learning improved by ten per cent (10%). Thus, use of mobile technology is proven to enhance literacy and improve the GPA of undergraduates. In essence, mobile technology use can improve academic performance as undergraduates are motivated and engaged to utilise their personal mobile devices for learning.

Technological innovations like web-searching and mobile technology have brought information to the doorstep of undergraduates, however, how they access the information and what they do with all the available information resources, are issues for concern. The fact that undergraduates in contemporary times have access to and make use of various mobile gadgets and are also called digital natives does not imply that they are excellent users of the information resources which they have at their disposal. Undergraduates are very much interested in using the widely available technology, and there are indications of the extensive use increasing the quality of education (Omolade and Opesade, 2017). However, the actual use of mobile technology by undergraduates for educational activities is low, and evidence showed that the use of the technology is not achieving full potential academically (Babarinde, Balogun and Odugbemi, 2018; Lateef, Adebanjo and Ibrahim, 2020). Thus according to Dahlstrom, Brooks, Grajek, and Reeves (2015) earlier conclusion, important and instinctive utilisation of mobile technology for academic activities could not be expected, even when technology is generally accessible or utilised in different settings.

Unlike using a desktop computer with several undergraduates at a time, mobile technology devices are owned personally, and undergraduates do not have to crowd around one computer (Iyamu and Mtshali, 2013). EDUCAUSE (2016) noted that the use of individually owned devices, that is, 'BYOD' (Bring Your Own Device) continues to grow on university campuses. Undergraduates can also access library information resources and services using mobile devices without any time constraints or the need for physical presence in the library, which used to be the norm. It is, therefore, imperative to comprehend how undergraduates utilise mobile technology for academic purposes and how the use predicts their academic performance.

Kim, Sin, and Yoo-Lee (2014) noted that advances in ICTs have brought about the explosion of information sources availability. These information sources are available in various forms ranging from print to electronic formats and are easily obtainable on the web through the Internet using mobile or other technologies. Academic libraries also collect and provide an array of resources to substantiate the teaching, research and learning processes in academic communities. In contemporary times,

undergraduates prefer to surf for information on the pages of the web before checking through the available information resources in the library as it is much faster and were easily accessible. Saurina, Kelly, Montenegro, González, Jara, Alarcón and Cano (2014) exploration of the association between library information resources use and learning outcomes of undergraduates confirmed this notion. Utilisation of the obtainable online information resources in the library by undergraduates also enhanced their learning.

Shrestha (2008) had reported that undergraduates who regularly used library resources understand that the accessible information resources in the library are more all-inclusive and scholarly than what obtains in most websites. This assertion was also corroborated by studies in Nigeria (Aladeniyi and Owokole, 2018; Ayim, 2019). The library is a social organisation with the responsibility to disseminate information. It is the nerve centre of any academic community providing the physical facilities, access to collections, and services that support learning and research. Soria, Fransen and Nackerud (2013) and also, Olorunfemi and Ipadeola (2021) in their view, observed that the library expresses the core values of an institution. Thus, the library is central to the fulfilment of the mission of any university, and this remains indisputable.

Although undergraduates use the university library, studies are suggestive of the fact that they do not obtain all the information they need and thus, rely less on the library as the primary source for accessing information (Soria *et al.*, 2013; Wenborn. 2018; Jamogha, Jamogha and Godwin, 2019). The library is supposed to play an essential role in supporting information accessibility. Traditionally, undergraduates use the library to either read or borrow books but in this technology age, their expectations of the library are changing. Undergraduates look forward to being able to learn anywhere while accessing library information resources and materials continuously in both physical and electronic formats. This initiative implies that within and outside the library, undergraduates can use information resources and can have the resources delivered to them irrespective of their locations.

From the preceding, academic performance is, therefore, the most crucial aspect of the educational lives of undergraduates in the university and the key to their future careers. Undergraduates search the web for information, use mobile technology extensively in their daily activities and utilise library information resources to enhance their academic activities. Technology is embedded in the lives of undergraduates and evidence abounds that the use could positively influence their academic pursuit and success. This study, therefore, investigated web-searching behaviour, mobile

technology, and library information resources use as predictors of the academic performance of library and information science undergraduates in Nigeria. Thus, it is essential to identify factors that could enhance the performance of undergraduates in their studies. Defining the factors and their relationship to academic performance could elucidate data that could serve as a template for the development of a support system for the undergraduates to enhance their performance at an early stage of their study.

1.2 Statement of the problem

There is an established positive relationship between academic performance and the worth of graduates from universities. Thus, if library and information science undergraduates attain high academic performance, they would likely become library and information science professionals equipped with required capabilities to produce quality services. However, recent studies have revealed that the level of academic performance of Nigerian undergraduates generally is declining, implying that poor quality graduates are likely being turned out by the universities into the labour markets. Therefore, new efforts based on deeper knowledge and understanding of the factors that can promote higher academic performance of Nigerian university graduates (including LIS graduates) is imperative to uplift the quality of graduates for the Nigerian and global labour markets.

There are several efforts which have been made over the years by scholars to ascertain factors that could significantly enhance the academic performance of undergraduates, including LIS undergraduates. One major identified critical factor that could improve academic performance is enhancement of the learning and the learning environment of students using Information and Communication Technology (ICT) has a tool. Developments in ICT are increasingly promoting the incorporation of technology in educational processes, which usually necessitates that undergraduates search the web for information, use mobile technologies for academic and other learning purposes daily and make use of library information resources available in various formats to aid their learning activities. However, there are concerns that though undergraduates usually use Google and other web search engines to search for information, they often come short of using the necessary skills to get the needed quality information from the web. Undergraduates also usually now own mobile devices as they are mostly digital natives, but their actual effective use of mobile technology for academic and related learning purposes is low. Many undergraduates also often shun the institutional libraries,

preferring the use of mobile technologies to search the Web directly, and those who use their libraries do not necessarily effectively use the available print and electronic resources.

Furthermore, studies on web searching behaviour have been mostly experimental in nature and not related to academic performance. There have been studies on the influence of each of web-searching behaviour, mobile technology and library information resources use with other variables on academic performance of students. However, there has been a dearth of studies on the simultaneous or joint influence of web-searching behaviour, mobile technology and library information resources use on the academic performance of undergraduates, and particularly LIS undergraduates in Nigerian universities. Therefore, to fill the identified knowledge gap, this study investigated how web-searching behaviour, mobile technology, and library information resources use predicted the academic performance of LIS undergraduates in Nigeria.

1.3 Objectives of the study

The general objective of this study was to examine how web-searching behaviour, mobile technology and library information resources use predicts the academic performance of Library and Information Science (LIS) undergraduates in Nigeria. The specific objectives of the study were to:

(i) determine the level of academic performance of LIS undergraduates in Nigerian universities;
(ii) identify the web-searching behaviour of LIS undergraduates in Nigerian universities;
(iii) identify the various mobile technologies used and the frequency of use by LIS undergraduates in Nigerian universities;
(iv) examine the extent of library information resources use by LIS undergraduates in Nigerian universities;
(v) determine the influence of web-searching behaviour on the academic performance of LIS undergraduates in Nigerian universities;
(vi) explore the relationship between the use of mobile technology and the academic performance of LIS undergraduates in Nigerian universities;
(vii) ascertain the relationship between library information resources use and academic performance of LIS undergraduates in Nigerian universities;

(viii) establish the relationship between web-searching behaviour and library information resources use by LIS undergraduates in Nigerian universities;

(ix) determine the relationship between web-searching behaviour and mobile technology use by LIS undergraduates in Nigerian universities;

(x) ascertain the relationship between mobile technology use and the use of library information resources accessed online by LIS undergraduates in Nigerian universities;

(xi) examine how web-searching behaviour, mobile technology, and library information resources use relatively predicts the academic performance of LIS undergraduates in Nigerian universities; and

(xii) determine how a combination of web-searching behaviour, mobile technology, and library information resources use significantly predicts the academic performance of LIS undergraduates in Nigerian universities.

1.4 Research questions

The following research questions guided the study:

1. What is the level of the academic performance of LIS undergraduates in Nigerian universities based on their Cumulative Grade Point Average (CGPA)?
2. What is the years of experience, frequency and point of accessing the web for academic activities by LIS undergraduates in Nigerian universities?
3. What are the search engines, web browsers, online information search strategies, and seeking processes frequently used for academic activities by LIS undergraduates in Nigerian universities?
4. What are the mobile technologies and applications frequently used for academic activities by LIS undergraduates in Nigerian universities?
5. What are the academic activities performed on mobile devices by LIS undergraduates in Nigerian universities?
6. What are the online information sources used on mobile devices for academic activities by LIS undergraduates in Nigerian universities?
7. What are the print and electronic library information resources available in the library and frequency of use by LIS undergraduates in Nigerian universities?

8. What is the relative influence of web-searching behaviour, mobile technology, and library information resources use on the academic performance of LIS undergraduates in Nigerian universities?

1.5 Hypotheses

The following null hypotheses were tested in the study at 0.05 level of significance:

H_{o1}: There is no significant relationship between web-searching behaviour and academic performance of LIS undergraduates in Nigerian universities.

H_{o2}: There is no significant relationship between mobile technology use and academic performance of LIS undergraduates in Nigerian universities.

H_{o3}: There is no significant relationship between the use of library information resources and academic performance of LIS undergraduates in Nigerian universities.

H_{o4}: There is no significant relationship between web-searching behaviour and use of library information resources by LIS undergraduates in Nigerian universities.

H_{o5}: There is no significant relationship between web-searching behaviour and mobile technology use by LIS undergraduates in Nigerian universities.

H_{o6}: There is no significant relationship between mobile technology use and the use of library information resources accessed online by LIS undergraduates in Nigerian universities.

H_{o7}: A combination of web-searching behaviour, mobile technology, and library information resources use does not significantly predict the academic performance of LIS undergraduates in Nigerian universities.

1.6 Scope of the study

The study investigated web-searching behaviour, mobile technology and library information resources use as predictors of academic performance of LIS undergraduates

in Nigeria. It covered all universities with library schools in Nigeria. The study included the 23 accredited LIS departments in Nigerian universities offering Bachelor of Library and Information Science (BLIS) programmes. They were in the six geopolitical zones in Nigeria, as revealed by preliminary investigations (See Table 3.2). The participants included all full-time 200, 300 and 400 level LIS undergraduates. They were purposively selected because their cumulative grade point averages (CGPAs) were readily available from their institutions.

The web-searching behaviour of the LIS undergraduates was examined in relation to their academic performance. Indicators of web-searching behaviour investigated included: online information seeking and searching strategies used for academic purposes such as behavioural, procedural, metacognitive, starting, chaining, browsing, monitoring, differentiating and extracting. The influence of mobile technology use on the academic performance of LIS undergraduates was investigated. The indicators of mobile technology use examined included: mobile technologies used and frequency of use, academic activities are undertaken with mobile technologies, location of use of mobile technology, online information sources accessed on mobile devices and frequency of use of mobile applications. Library information resources use was investigated in relation to purpose and frequency of library visits, frequency of use of available print library information resources, frequency of use of available electronic library information resources and location of use of library information resources. Academic performance of the LIS undergraduates was examined in terms of their CGPA from the previous session.

The scope of this study excluded variables like university facilities, study habits of undergraduates, former school background, study hours of undergraduates, intellectual endowment, class size, financial status, parents' socioeconomic status, admission scores, the point of entry, the personal motivation of students and self-efficacy among others.

1.7 Significance of the study

This study reaffirms the statement that education is the most proven vehicle for sustainable development in any nation. The study would provide education policymakers with information on best practices that could be adopted to improve the performance of LIS undergraduates and undergraduates in general. The study outcomes would also have far-reaching implications for library schools and academic library

management in the design of library instruction programmes and the teaching of web-searching skills in Nigerian universities. The outcome of this study could be beneficial to curriculum developers (for example, NUC in revising the BMAS, and LRCN, the highest monitoring body for LIS teaching and practice in Nigeria) in the development of the library studies curriculum and the inclusion of relevant skills to enhance the curriculum and secure accreditation of the programme.

This study would guide the university and library management on the need to put in place appropriate facilities mainly in the area of mobile technology and library resources. This would immensely increase the importance of the university library and improve the image of Nigerian universities to be at par with their international counterparts. The underlying principle of this study is that web-searching behaviour, mobile technology and library information resources use of undergraduates could predict their academic performance. Thus, the study would add to the vast increasing body of research on factors that could enhance the academic performance of undergraduates.

It is an expectation that the outcome of this research would provide current information on the activities engaged in during a search process and the most used search strategy by the LIS undergraduates while surfing the web for academic purposes; the types of mobile technology used and the library information resources mostly used. The results of the study would bring to the fore a clearer perspective of the relationship between web-searching behaviour, mobile technology, library resources use and the academic performance of undergraduates. This study could be informative on how these factors are likely to cause improvements in undergraduates' performance and enhance attitude to learning.

The study would also provide useful information on the relevant contributions of web-searching behaviour, mobile technology use and library information resources use to the academic performance of LIS undergraduates in Nigeria. The result of this study would tremendously benefit LIS undergraduates, and other undergraduates as the information provided could be used to promote academic performance among the undergraduates. Having an understanding regarding the strengths or weaknesses of LIS undergraduates in performing web-based learning activities and search would enable LIS educators to guide the undergraduates in developing more useful web-searching behaviour thus allowing undergraduates to increase control over their learning activities, vis-a-vis their academic performance.

Analysing the associations between library information resources use and academic performance would provide academic libraries with evidence-based data that could inform improved service delivered to users. The outcome could inspire improved and efficient services, the implementation of new/creative services, and proficient distribution of resources for a beneficial effect on the academic performance of undergraduates and all other library users in general.

This study could also inspire website, search engines and mobile technology platform designers to develop student-oriented educational websites, search engines and mobile applications. These initiatives would provide the needed support and assist the undergraduates to properly engage the use of the web and mobile devices for academic purposes. Researchers, academics and librarians could also make use of the outcome of this study to expand their knowledge of web-searching behaviour, how LIS undergraduates in Nigerian universities utilise the technologies on their mobiles and the available information resources in the library to support their academic activities.

1.8 Operational definition of terms

The operational definition of key terms is as follows:

Academic performance: is the Cumulative Grade Point Average (CGPA) which is the total calculated examination scores of all the courses undertaken by LIS undergraduates in a Nigerian university. It was measured by classifying the CGPA grades of the undergraduates into High, Medium and Low.

Library information resources use: is the usage of the information resources provided by the university library by LIS undergraduates in Nigerian universities for academic activities. It was measured using scales titled "Use of Library Information Resources (Print and Electronic) by LIS Undergraduates.

LIS undergraduates: refer exclusively to undergraduates enrolled in LIS schools in Nigerian universities on a full-

time basis who are pursuing a programme for the award of Bachelor's Degree in LIS.

Mobile applications: are the applications on mobile devices like file sharing applications, eReader applications, browsers, among others that could be useful in increasing LIS undergraduates' skills and learning abilities.

Mobile technology use: is the application of the technology platform designed for and used on mobile devices by LIS undergraduates in Nigerian universities. This includes Smartphone, Tablet PC, eBook Readers, Personal Digital Assistant and Laptop. This was measured with a scale titled "Mobile Technology Use of LIS Undergraduates"

Web-searching behaviour: refers to the online information searching strategies (control, disorientation, trial and error, problem solving, purposeful thinking, select main ideas and evaluation) and online information seeking behaviours (starting, chaining, browsing, differentiating, monitoring and extracting) on the web that requires LIS undergraduates in Nigerian universities to interact with search engines to retrieve information. This was measured with a scale tagged "Web-searching behaviour of LIS Undergraduates".

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This chapter presents a general overview of the literature reviewed under the following subheadings:

2.1 Academic performance of undergraduates in library and information science schools
2.2 Web-searching behaviour of undergraduates
2.3 Mobile technology use by undergraduates
2.4 Library information resources use by undergraduates
2.5 Web-searching behaviour and academic performance of undergraduates
2.6 Mobile technology use and academic performance of undergraduates
2.7 Library information resources use and academic performance of undergraduates
2.8 Web-searching behaviour and mobile technology use by undergraduates
2.9 Web-searching behaviour and library information resources use by undergraduates
2.10 Mobile technology and library information resources use by undergraduates
2.11 Theoretical frameworks
2.12 Conceptual model
2.13 Appraisal of the literature reviewed

2.1 Academic performance of undergraduates in library and information science schools

Library and information science (LIS), a discipline with a body of interrelated concepts and techniques, encompassed all facets that manage information and library operations organised into various courses and taught at the university level to produce practitioners with recognised professional certification. LIS is concerned with the entire information transfer process, which is continuously evolving to incorporate new topics

like database management, information architecture, and management, among others (University of Michigan, 2014). LIS education introduces undergraduates to theories, research, and methodologies, along with the practice of library and information science. They would, therefore, be able to cultivate the knowledge of information representation, organisation, construction, content, gatherings, use and technology (University of Michigan, 2014).

As an academic programme, LIS introduces undergraduates to theories and approaches to research, as well as the application of training, perspectives, education, and administration tools, among others to libraries practices. The nature of the LIS profession in the 21st Century as multi-disciplinary and multi-dimensional has paved the way for prospects and challenges for LIS education in developing countries, including Nigeria. LIS programme makes use of the latest technology and teaching methods because it is becoming a highly competitive programme. The LIS programmes in Nigerian universities are to reflect the philosophy, objectives and the minimum requirements of NUC. The programme aims to enable LIS graduates to meet the requirements of employers and for self-employment after training and education as undergraduates. The onus then lies on the LIS schools to equip the LIS undergraduates with capacities to utilise the emerging technologies for more academic activities and not just entertainment.

It expected that LIS undergraduates would engage in learning, gain expertise, complete academic programmes to get them ready for the workplace (Rhodes, 2008). They are expected to gain knowledge and develop abilities and attitude while at the university to combat the challenges of globalisation (National Universities Commission (NUC), 2014; Okebukola, 2015). They are also in the university being trained in the utilisation of emerging technologies which will provide them with more options while seeking jobs as LIS graduates (Potnis, Cortez and Allard, 2015). According to the International Federation of Library Associations and Institutions (IFLA, 2012), LIS undergraduates are mandated to obtain broad training as a vast segment of the complete instructive programme for the information profession. LIS undergraduates are being educated and studying in an information world that keeps changing with technological changes and innovations. The LIS graduates of this generation become a part of the profession that continues to anticipate and respond to future challenges of the information age.

The Benchmark Minimum Academic Standards (BMAS) expressively specified that LIS education is projected to graduate library and information professionals that are imparted with relevant competencies and skills and exposure to training that would enable them to meet the requirements of employers or self-employment and be a useful member of the society (NUC, 2014, 2018). Accordingly, Librarian's Registration Council of Nigeria (LRCN, 2017) projected the education and training of undergraduates in LIS to produce experts in LIS for an extensive range of library, information and archival centres; prepare the products of the programme with pertinent knowledge based on theory, functional abilities and skills to create and improve performance at work; support enquiry and innovativeness among the professionals so they are equipped with understanding of the emerging ideas on the job in an intricate, multi-social, diverse ethnic society like Nigeria; furnish imminent LIS experts with the scholarly and professional foundation satisfactory for their jobs which will make them versatile in evolving circumstances; and lastly, to make available understanding on the new trends and emerging roles of ICT in information management.

In light of these objectives, more ICT courses were incorporated into the LIS curriculum following the guidelines of the BMAS (NUC, 2018) to ensure that the education and training of the undergraduates are in line with world best practices. Therefore, LIS educators are encouraged to implement ICT in the curriculum to guide the undergraduates in use, enhance attitude to learning, improve upon the academic performance of the undergraduates, and thus, remain relevant in practice and demands of the profession (LRCN, 2017)

Generally, the academic performance of undergraduates has received considerable attention in the literature. Educationalists, instructors, and researchers have always been keen on analysing factors that contribute to undergraduates' performance, especially academically. Crosnoe, Johnson and Elder (2004) observed that these variables are found within or out of school environments, and these comprise student, family, school and peer factors. Investigations into the outcome of demographic factors on the academic performance of undergraduates started in the seventeenth century (Mann, 1985). According to Ballatine (1993), most of the time, age, sex, geographical belongingness, origin, marital and socioeconomic status (SES), and profession of parent and educational level, earnings and religious affiliations are what constitute demographic factors. Thus, demography connotes a technique that reconnoitres the nature and effects of facts about the students' background and social setting. The

significance of education can be quantified by relating the demographic factors to the academic performance of undergraduates. However, these demographic factors are prevailing variables, and since defining the nature of training is not a simple issue, other factors are always taken into consideration (Parri, 2006; Blevins, 2009).

Academic performance, as one of the principal goals of a university, is usually measured by examination results (Kyoshaba, 2009). Universities are established to impart knowledge and skills that enhance excellent academic performance in the undergraduates to produce high-quality human resources for the nation's workforce. Academic performance is, therefore, any academic input that produces academic outcomes (Division of Student Affairs, Obafemi Awolowo University, 2015). Such outcomes are not limited to excellent results obtained through test and examination scores but also include the learning outcomes of undergraduates at the end of a learning programme. Thus, academic performance is well-defined as the degree to which undergraduates achieve educational objectives, goals, and outcomes.

Academic performance is crucial to the overall success of undergraduates. This statement is true because it reflects the accomplishments of specific set goals of the university. Even after the university education, academic performance determines whether an undergraduate will have opportunities to proceed on postgraduate programmes as well as influences vocational career of the undergraduates. There exist a substantial nexus between high academic performance and positive socio-economic development of a nation (Steinmayr, Meißner, Weidinger and Wirthwein, 2017). This was one of the reasons for revising the BMAS by NUC, to update the standard and importance of college training in the nation just as to incorporate entrepreneurship as well as peace and conflict courses as fundamental new stages that will ensure all products of universities in Nigeria the information and fitting aptitudes, abilities and manners that will make them all around focused and fit for contributing profoundly to the advancement of Nigerian economy (NUC, 2014). On this premise, an international study, Programme for International Student Assessment (PISA), was organised to study academic achievement, with the overarching aim of guiding education policy decision-makers by collecting information to analyse the strong suit and flaws of the educational system of a nation (Organisation for Economic Co-operation and Development (OECD), 2018; Okedigba, Adedigba, and Okedigba. 2019).

Academic performance is characterised by performance in examination (Cambridge University Reporter, 2003). In the same token, academic performance is a

means of evaluating the educational standing of undergraduates in a given educational pursuit in an institution, and thus, the concept of measurement of academic performance of undergraduates is inevitable in a formal educational setting. It involves the grade point average (GPA). The GPA is the average grades, including assignments, projects, quizzes and examination marks (Twum, 2014). Richardson, Abraham and Bond (2012) observed that even though undergraduates' academic performance could be measured by performance in a particular subject or results of the previous year, the commonly used measure for the academic performance of undergraduates is GPA.

Background research into university GPA scores of undergraduates by Richardson *et al.* (2012) generated an all-inclusive, applied guide of known correlates of tertiary GPA. These include a degree of averagely weighted relationships with GPA and multivariate models of GPA associates inside and crosswise over research areas. These constructs were found to determine undergraduates' academic performance measured in terms of their GPA. Other constructs identified which are non-intellective but with distinctive research areas are character traits, motivational factors, self-regulated learning plans and approaches of undergraduates, together with influences of psychosocial context. Academic self-efficacy, grade target, and effort regulating non-intellective constructs were also reported to have medium-sized correlations with GPA.

Notwithstanding, several assessment instruments have been used in universities to determine the total performance of undergraduates since the introduction of the course unit system. The assessment instrument could be Weighted Average Mark (WAM), that is, Cumulative Weighted Average Mark (CWAM) or Cumulative Grade Point Average (CGPA) or Non-Weighted Average Mark (NWAM), that is, Cumulative Average Mark (CAM) or Cumulative Average Grade Point (CAGP) (Omotosho, 2013b). Consequently, CGPA is used all over the world in the course unit system (CUS) of universities education. Percentage marks are mapped into an n-grade point system, where 'n' could be any number less than 100 to generate the CGPA. Nevertheless, it is essential to note that 'n' has never taken a value greater than 12 and in the grading systems in Nigerian universities, 'n' varies between 4 and 7 giving rise to 4, 5, 6 and 7-grade points, with 5-grade points as the most common (Omotosho, 2013a).

The importance of the grading system used in universities to assess the performance of undergraduates could be deduced in the statement of Dr Gidado Bello Kumo, the Director of Academic Standards, National Universities Commission (NUC, 2015). He stated that the grading framework is not just an educational parameter for

academic programmes offered in Nigerian universities, but besides, a critical segment of the Academic Brief of the universities which are the statutory prerequisites for the endorsement of a university that determine the pattern of the scholarly development of the university. He further noted that a satisfactory university education policy could be generated if the Benchmark Minimum Academic Standard (BMAS), in which the CGPA computation and grading are incorporated, is made all-encompassing (NUC, 2015).

To align the grading systems in Nigerian universities with other universities worldwide for best international practices, NUC abolished the 'Pass degree' and adopted a new 4-Point grading system to be implemented latest by 2017/2018 academic session (Lawal, 2018). The grading scale indicates A (70% and above) to be 4, B (60-69%) will be 3, C (50-59%) will be 2, D (45-49%) will be 1 while E (40-44%) will be 0. Thus, the CGPA classes in the new 4-Point grading scale for the classes of degrees will be First Class Honours – 3.50 - 4.00; Second Class Honours (Upper Division) – 3.00 - 3.49; Second Class Honours (Lower Division) – 2.00 - 2.99 and Third Class Honours – 1.00 - 1.99 (Kehinde, 2017). Undergraduates with CGPA less than 1.00 are not awarded any degree.

However, there are observations that the use of the 4-Point grading system increases the percentage of undergraduates having a 1st Class degree, whereas it reduces the tendency of acquiring an average class of degree. In addition to this, universities in Nigeria, foreign universities and international organisations have raised pertinent questions on the correlation between the certificate issued with 4-point scale and those issued earlier on a 5-point scale. Subsequently, NUC issued a directive to vice-chancellors in universities in Nigeria to return to the 5-point scale starting from 2018/2019 academic session (Adesulu, 2018).

2.1.1 Empirical studies on factors affecting the academic performance of undergraduates

Researchers view academic performance as a major predictor of the outcome of education at all levels (Ruban and McCoach, 2005; Fenollar, Roman and Cuestas, 2007). Fenollar *et al.* (2007: p. 874) opined that the social-cognitive theory of motivation by Dweck is a very relevant view to understand academic performance. According to the theory, students' performances are a function of longings to accomplish specific goals. The focus has been on two principal goals of learning: learning (otherwise referred to as mastery or task-oriented) goal and performance (otherwise refer to as ego-oriented) goal

(Fenollar *et al.*, 2007). Researchers (Elliot and Church, 1997; Elliot and McGregor, 2001) have reported that these goals are constructed as approach and avoidance forms of regulation. Accordingly, the goals are independent, each having a discrete bearing on the performance of the students. For example, the learning approach goal has a more positive impact than learning-avoidance goals and performance-avoidance goal.

Undergraduates with a learning goal orientation attempt to master a specific task to improve themselves regardless of the number of slip-ups they might make. They extend their learning further than the minimum obligatory and follow the learning process. Learning goal-oriented undergraduates are probable to get involved in more self-regulated activities, tend to accomplish higher tasks, learn more, and carry on even after failure. This is in contrast to performance-goal-oriented undergraduates (Miltiadou and Savenye, 2003). Performance-goal-oriented undergraduates are worried about positive appraisals of their aptitudes in contrast to others. They want to look smart, and they try not to seem inept, they usually run away from responsibilities that are challenging and show stumpy tenacity in the presence of demanding obligations. Therefore, they rarely retain the information they learn (Elliot and Dweck, 1988; Miltiadou and Savenye, 2003). In terms of work avoidance goal, however, there are opinions that it should be separated from learning and performance goals as there is little study to establish the existence of such goal (Seifert and O'Keefe, 2001; Nurmi, Aunola, Salmela-Aro, and Lindross, 2003; Fenollar *et al.*, 2007). The relationships between all these factors are as shown in Appendix 1 (Fig 1).

Within the study strategies, the overall effort used in the process of studying is referred to as effort. Literature has shown that undergraduates with mastery goal, are a task or learning goals oriented and they always put more effort into learning because of the desire to build up skill, knowledge and comprehension (Murphy and Alexander, 2000). Undergraduates with such goals are interested in cultivating their competence and expertise (Vermetten, Lodewijks, and Vermunt, 2001). They have a belief that their success or failure depends on personal effort. Thus they engage in profound strategic developments (Seifert and O'Keefe, 2001). Intrinsically, it is not shocking that such undergraduates will make use of technologies and cultivate the necessary skills to enrich their learning. Undergraduates who desire to achieve specific academic goals will put into making use of available facilities towards the achievement of academic excellence. Fenollar *et al.* (2007) further observed that researchers had used Bandura's self-efficacy

theory, which signifies the principle of a person to implement a sequence of action essential to achieve the anticipated goal, in explaining academic performance.

Some studies that have looked into factors that predict academic performance in the university context considered the influence of class size (Karakaya, Ainscough, and Chopporian, 2001; Fenollar *et al.*, 2007). The studies revealed that undergraduates in smaller classes perform better when compared to those in larger classes. For instance, Arias and Walker (2004) examined two broad classes of 90 undergraduates and two small classes of 25 undergraduates having the same instructor and course content. The comparison of the total exam scores revealed that the undergraduates in the smaller classes performed 3% higher than the undergraduates in the large classes. However, class size makes a difference in elementary schools, but the way it affect the academic performance of undergraduates is insignificant (National Council of Teachers of English (NCTE), 2014). This opinion was in tandem with the conclusions of Iaria and Hubball (2008) that although large class reduces the period the undergraduates used naturally in discussion and interaction when compared with a small class, the two classes met the determined learning objectives.

In Pakistan, a study that investigated variables that impact the academic performance of undergraduates based on CGPA observed that availability of learning facilities and proper guidance was positively associated with the academic performance of undergraduates (Mushtaq and Khan, 2012). Gender, teaching style and academic qualification of the teachers, class environment, motivation, interest, intelligence, self-concept, aspiration level and genetic endowment, socio-economic factor, and family educational background were also found to influence the academic performance of undergraduates positively. Class size was also found to have positive effect on the academic performance of undergraduates in smaller classes as they accomplished more than those in larger classes.

The influence of motivation and participation in online courses like MOOC on the performance of students in one of the Economic courses obtainable at the University of Melbourne, a course offered in partnership with Coursera was examined by De Barba, Kennedy and Ainley (2016). The course was delivered over eight weeks using a tradition course design used for MOOCs which include access to short video lectures and completion of practical or graded quizzes and performance was measured in relations to the final grade accomplished by the undergraduates. Of the 49595 students who partook in the online course, 862 duly filled the questionnaire used for data collection. The

researchers found that motivation, such as value beliefs and mastery approach influenced academic performance and motivation itself, was affected by participation. This finding agreed with Kizilcec, Piech and Schneider (2013) who observed that the performance of undergraduates is better when they are engaged in activities.

The impact of age, socioeconomic status (SES), and gender on the academic performance of Nigerian undergraduates was also studied by Ebenuwa-Okoh (2010). One hundred and seventy-five respondents filled the questionnaire while their CGPA was collected from the departmental office. The study revealed that academic performance is not predicted by age, finance and sex. However, some studies are contrary to this finding. For example, Ali, Haider, Munir, Khan and Ahmed (2013) carried out an investigation that involved 100 undergraduates of Islamia University of Bahawalpur, Rahim Yar Khan Campus. Data was collected on factors that determine undergraduates' academic performance using a questionnaire. The reports showed that age and parent/guardian socioeconomic status, as well as regular study hours, contributed meaningfully to the undergraduates' academic performance. They concluded by proposing a linear model that can enhance the academic performance of undergraduates. Scholars have also look at the various factors that could influenced the academic performance of 144 Singaporean tertiary institution undergraduates using the questionnaire and their CGPA (Jayanthi, Balakrishnan, Ching, Latiff, and Nasirudeen, 2014). The findings revealed that sex, the race of the undergraduate, non-academic activities and desire to pursue higher degrees are issues that impact the undergraduates' academic performance.

In the United Kingdom, Houston (2016) examined the predicting ability of attribution style on the ensuing scholarly performance of 979 undergraduates from schools with high and low performances and found that attribution style can influence the undergraduates' academic performance either positively or negatively. High academic performance is predicted by real events, while adverse events caused unsatisfactory academic performance. The study also showed that students from high achieving schools have high academic performance compared with students from low achieving schools, notwithstanding the attribution styles. Jiménez-Caballero, Ruiz, Gonzalez-Rodriguez, and de Fuentes (2015) analysed the impact of the order of preference for the degree, admission scores and gender the on the first-year academic grades of 572 undergraduates admitted for 100 level Finance and Accounting degree in the European Higher Education Area. They were able to conclude through the results

that the influence on the grades of the undergraduate is insignificant, but an order of preference for degree and admission scores was related directly with the undergraduates' academic performance.

Gedefaw, Tilaun and Asefa (2015) in a bid to understand factors that predict the academic performance of undergraduates in medical schools, conducted a study in an Ethiopian university involving 592 undergraduates using an analytical cross-sectional method. The study revealed that the self-reported CGPA of the medical students had been declining over the years. The factors identified by the researchers include low entry results and the use of like tobacco, alcohol and drug stimulants like *khat*. They suggested that effective measures should be taken to curb these factors and that further studies should be undertaken to understand other positive contributors that could enhance the learning outcomes of undergraduates. Recently, Aciro, Onen, Malinga, Ezati, and Openjuru (2021) explored results of earlier studies to establish the relationship between pre-university and university academic performance of undergraduates. Fifty-nine articles drawn from several open access sources from all the continents were reviewed. The study concluded that more research is needed to ascertain the relationship entry grade has on academic performance of undergraduates as there were no consensus between all the articles reviewed.

In Nigeria, studies have also examined contributors to high academic performance among undergraduates. Okafor and Egbon (2011) compared the grades of first-year male and female undergraduates offering introductory financial accounting courses at the University of Benin for two academic sessions using grade performance. They found no significant disparity between the academic performances of both genders though the male undergraduates performed slightly better than the female undergraduates in all the courses. However, the limitation of the study is that it incorporated only courses in Accounting. Ogedebe (2012) studied the connexion between Internet use and performance of undergraduates in academic courses in higher institutions of learning in Nigeria. The study collected data on the extent of Internet usage and its effect on the performance of 350 undergraduates using a questionnaire. The findings revealed that Internet services improved the performance of students when fully exploited. The study concluded that there exist positive correlations between Internet usage and academic achievement. Thus students could use the knowledge of the Internet to improve their academic performance.

Alimi, Ehinola and Alabi (2012) also examined factors that influence undergraduates' academic performance in Ondo State, focusing on school types and facilities. Although the research indicated that the facilities that were available in the two school types studied, which were public and private schools, were significantly different, no substantial disparity was identified in the academic performance of the undergraduates. Furthermore, some researchers (Madukoma, Onuoha, Omeluzor, and Ogbuiyi, 2013) investigated the association between instructions in library programmes and the academic performance of undergraduates at Babcock University, Nigeria, using survey research design. The study which involved 1318 undergraduates indicated that library instruction programme not only helps the students in looking for and finding resources with valuable information in the library but also affect the academic performance of the undergraduates positively.

Furthermore, scholars have related academic performance with the mode of admission or point of entry of undergraduates. The comparative study by Joe, Kpolovie, Osonwa and Iderima (2014) in University of Port-Harcourt revealed that mode of admission or point of entry could influence academic performance. They analysed the class of degree of postgraduate students taken in through the Unified Tertiary Matriculation Examination/Post Unified Tertiary Matriculation Examination (UTME/PUTME) and other introductory programmes comparatively using ex-post facto design. The sample size of 1,200 graduates was drawn from a study population of 13,898 from seven faculties covering two sessions, and the CGPA of the postgraduate students were collected from the university office. The result of the study showed that undergraduates who passed through the introductory programmes graduated with higher grades than those who were granted admission through UTME/PUTME. Olufemi, Adediran and Oyediran. (2018) observed that the academic performance of students in colleges of education in Nigeria is declining based on the quality of teachers that are produced yearly. Some of the factors attributed to this include parental background, school, students and teacher factors.

2.2 Web-searching behaviour of undergraduates

Web-searching behaviour implies searching and seeking the web for information and the interaction of a user with search engines to locate needed information (Kinley, 2013). Information behaviour provides background knowledge of information use by students or other users on the web. Ingwersen and Järvelin (2005) opined that

information behaviour includes all the activities involved in using information, such as information seeking behaviour and retrieval of interactive information. Wilson (2000) went further to define information behaviour as human conduct in its totality and the connection with information sources and channels which include seeking and using the information actively or passively. Kinley (2013) explored the connexion between cognitive styles of users and web-searching behaviour and surmised that web-searching behaviour could be described in connection with strategies used by users in information searching, styles of web navigation, and skills involved in the reformulation of a query. In other words, information search strategies, navigation styles, and query reformulation skills could determine the way students search the web. Information seeking behaviour, which is the crust of web-searching behaviour, entails seeking for information purposively by interacting with physical information systems like the library or electronic-based systems like the Internet or the web (Wilson, 2000).

Some studies conducted on the searching behaviour of undergraduates while using electronic resources on the web revealed that they utilise the web for all the activities. Undergraduates could spend minutes or hours searching the web, have varying searching skills, view themselves to be more dexterous than they are and make use of the comments on the discussion list box on the web as they will use articles in a peer-reviewed journal (Cmor and Lippold, 2001). Navarro-Prieto, Scaife and Roger (1999) (as cited in Griffiths and Brophy, 2002) seeking to build a model for web-searching studied 23 undergraduates in a Computer Science Department, University of Sussex. Their findings brought to light some interesting points and different general patterns of searching. Most of the students could not remember their searches, search engines and queries with no positive results. Three web-searching patterns identified were: top-down strategy, where students generally search before narrowing it down to links provided until the discovery of needed information; bottom-up strategy, where students use specific keywords given in the instruction and scrolling through until the discovery of the desired information; and mixed strategies, where students combine the use of the two other strategy, mostly use by experienced web searchers (Griffiths and Brophy, 2002)

The web, by its dynamic nature, requires students to activate their metacognitive domain and general knowledge in information searching and seeking (Civilcharran, Hughes and Maharaj 2015). Students logically turn to the web for both academic and non-academic purposes when looking for information, because of the convenience and

the volume of available materials. They are therefore required to be active to perform the necessary tasks when searching the web to be able to retrieve valuable information and use it effectively (Hoque, Hoeber, Strong and Gong, 2013). Some of the tasks required comprise of ability to hone queries creatively, browse, filter, scrutinise, explore result sets, analyse, understand, organise and saving of the retried documents (Hoeber 2008). User behaviour, capabilities of the system, outcome of the search and the nature of the search task were also highlighted by Alharbi, Smith and Mayhew (2013) as factors that could influence the web-searching behaviour of students.

In Nigeria, Baro, Onyenania and Osaheni (2010) study established that starting, browsing, chaining, differentiating, extracting and monitoring were the information seeking behaviour of undergraduates. Oriogu, Okwilagwe, and Ogbuiyi (2016) study indicated that search engines could influence information seeking behaviour and noted that Google and Yahoo were the most preferred browsers among the undergraduates. Krubu and Zinn (2018) discovered that some critical factors that determine the information seeking behaviour of undergraduates include untimeliness of outdated sources, time restrictions, physical barriers (unstable electricity and speed of access among others) and intellectual barriers (search strategies formulation, keywords and choosing appropriate subject headings among others). On the other hand however, Sulaiman (2020) revealed that some LIS undergraduates exhibit fear when accessing the internet for information and recommended web search activities that would improve self confidence in the undergraduates when searching for information on the web.

2.2.1 Information search strategies

Researchers have investigated the online information search strategies of individuals. Large, Beheshti and Rahman (2002) discovered that, when it comes to formulation of queries, rate of clicking more hyperlinks per minutes, number of hits, a fewer amount of time spent looking through personal pages or visiting pages more regularly, males search more actively than female. Rieh (2002) reported that acceptance of a web document is affected by the topic of interest of the user. Web experience, epistemological belief and prior knowledge of undergraduates were also reported to play an indispensable role in the web-searching strategies of users.

Furthermore, studies on web search evaluation were summarised by Spink and Jansen (2004) into a group of three. The first group include users in a laboratory experiment or natural arrangement. The second group of study are those that used client-

side/server-side transactional recordings and analyses log file while the third group were those involving surveys web search issues. Tsai (2009) observed that most of these studies emphasised analysing moves or the procedure used by the user to interact with search engines (for example, syndication and reformulation of queries) instead of using advanced search strategies (e.g., cognitive strategies). However, these studies and some others all involved small samples; it is, therefore, difficult to establish statistical significance. Tsai (2009) then suggested a re-examining of the studies using a consistent assessment tool on big sample sizes. Based on this argument, it is necessary to study web search strategies of individuals using an evaluation tool that is acceptable with high-reliability items that are well-constructed.

Subsequently, an evaluation instrument, Online Information Searching Strategy Inventory (OISSI), was developed by Tsai (2009) using Tsai and Tsai (2003) framework and Tsai and Liu (2005) pilot study. The OISSI has two versions, the quick version with 13 items and the full version with 25 items, both having reliabilities of 0.85 and 0.91 respectively. The items of the instrument are grouped into three main domains with different constructs, which include; behavioural domain with disorientation and control constructs; procedural domain with problem-solving and trial and error constructs; and lastly, metacognitive domain with select main ideas, purposeful thinking and evaluation constructs. OISSI was tested on 324 undergraduates, and the score showed a considerable variation in the behavioural and procedural domain strategies used by the undergraduates when gender was considered but no significant variation in the metacognitive domain strategies.

As a follow-up, Tsai, Liang, Hou, and Tsai (2012) evaluated the part played by two search contexts, searching for academic activities and searching for daily life information of 304 undergraduates in Taiwan using the complete OISSI. The findings revealed that the online search strategies, specifically, behavioural and metacognitive strategies, utilised by the undergraduates day to day information search, were more advanced than those used for academic activities. Given this, the researchers suggested the need for educators/instructors to assist undergraduates in developing online search strategies useful for academic activities.

Undergraduates are faced with some difficulties when they surf the web for information because of the complexity of the Internet. They employ different search strategies and numerous information retrieval tactics to uncover information on the web. There were reports that undergraduates have problems in critically evaluating

information resources on the World Wide Web (www), comprehensive and detailed summary of web contents, specifying search terms and regulating search process (Tsai, 2009). Georgas (2014) in a study carried out at Brooklyn College reported that undergraduates assumed themselves as experienced on the web, but their query formulations and behaviours do not support this assumption. The 32 undergraduates involved in the study did not identify keywords and related terms but performed a simple keyword search. They did not employ reformulation or refining research questions; neither did their search queries moved beyond the first page of results nor examining metadata to enhance searches. Kinley (2014) then surmised that familiarity of the user with browsing the web through search engines influenced the web search strategy and satisfaction level of the user while searching the web.

2.2.2 Information seeking on the web

Catledge and Pitkow in 1995 were the first to carry out any significant investigation on how information is sought for on the web (Choo, Detlor and Turnbull, 2000). They modified a browser to be used by the undergraduates of the Computer Science Department, Georgia Institute of Technology. They discovered that the web pages bookmarked by users generally did not match those visited by the students. Following this, researchers, (Tauscher and Greenberg, 1997a, 1997b) found that how information is sought for on the web might be subject to the functionalities of the web browser that make it go back quickly to pages earlier viewed. Other scholars (Kim, 2001 & Jenkins, Corritore and Wiedenbeck, 2003) also discovered that information seeking on the web is influenced by online search experience and cognitive style. Kim (2001), therefore, suggested the improvement of web interfaces and conduction of training for users. When the web and search engines are flexible, users can perform search successfully, although the search techniques used by the users is determined by the task performed on the web (Kim and Allen, 2002).

Although research on information seeking behaviour while surfing the web started in the 1980s, the first information seeking model was developed in the 1990s by David Ellis (Ge, 2010). The bases for the model was on how social scientists search and interact with information materials on the web rather than how the materials were acquired or sources used. Choo *et al.* (1999) and Ge (2010) noted that users' information seeking behaviour while surfing the web, could be mapped with starting, monitoring, chaining, browsing, differentiation and extracting on Ellis' model, the six characteristics

of information seeking. A user while on the web, could search favourite web pages (starting), follow hypertext to linked information on other web pages (chaining), scan selected web pages (browsing), bookmarked sources of value to consult (differentiation), subscribe to mailing lists/alerts on information of interest (monitoring) and or search a known site for particular information on search topic (extracting).

Information seeking behaviour involves examining features and disparities that identify users as information seekers rather than exploring information searching activity (Martzoukou, 2005). The experience of users do not merely concentrate on ways of acting, that is, the physical extent of information seeking but integrate ways of thinking and feeling, that is, cognitive and affective factors, respectively. Another aspect that is also significant to information seeking is the social situational aspects (Kuhlthau 1993). As Wilson (1981) emphasised, a person is not merely motivated to seek for information for academic purposes but because of the need to interact as a social entity, who lives and work in a social setting, which create the impetuses to search for information. There were observations that the knowledge of users on the web influences their information behaviour.

Cognitive styles and abilities of the users determine how strategies and tactics of searching were formed while on the web seeking for information. This assumption was confirmed by the experimental study carried by Saito and Miwa (2007), which evaluated the educational outcome of a learning environment designed to support reflective activities of students while seeking for information on the web. The learning environment was created to visualise the search processes of students based on their cognitive schema as well as to support and expedite reflective actions. The outcome of the experimental study revealed that the search performance of the participants was improved because they were able to change their impression of the essential activities while on the web seeking for information and performed more search process than the control group.

On the web, information seeking, which was termed information practices by Palmer, Teffeau, and Pirmann (2009), is also influenced by emerging information resources and tools. Thus, Ge (2010) conducted interviews to measure the information seeking behaviour of 30 students and lecturers in the Social Sciences and Humanities Faculties, Tennessee State University on the web. Eight online information resources, the web, databases, e-journals, online catalogues, emails, listservs, file transfer protocol (FTB) and web portals were rated. The findings of the study which confirmed Palmer *et*

al., (2009) earlier submission, showed that the web, databases and e-journals had the highest influence on the respondents' information seeking behaviour on the web. The study further strengthened the vital role that the six characters of Ellis' model continued to play in information seeking and suggested two more characteristics, preparation and planning as well as information management (Ge, 2010: p.451). These new research developments showcased the methods used by social sciences and humanities in locating appropriate information. These innovations call for further research, development of new assessment tools and information systems are more flexible and user-friendly.

2.3 Mobile technology use by undergraduates

GeoPoll and World Wide Worx companies (IT News Africa, 2015), in a study, termed, 'The Mobile Africa 2015,' surveyed 3500 mobile phone users in five countries in Africa namely, Ghana, Kenya, Nigeria, South Africa, and Uganda. The most important outcome of this study was that 40% of the phone users in the African countries studied browsed the internet via their phones. Aginam (2015) citing Ericsson's Internet Goes Mobile Country report in Nigeria stated that, the most common device used accessing the Internet and its content is the mobile phone and that, smartphone at 84 per cent is among the most owned devices by Nigerians used for the Internet connection. However, statistics recently revealed an increase to 94 per cent of the penetration of mobile phones in Nigeria (Adepetun, 2016).

West (2013) believes that students are in tune with mobile technology and prefer to employ a mobile device to make educational activities more engaging. He also asserted that mobile devices permit undergraduates to link, use and create information using electronic resources. The use of mobile technology aids communication, knowledge sharing, and teamwork among students in informal settings with their acquaintances and relatives irrespective of time and location. Undergraduates devote more time to casual engagements than educational activities. In all, a major crucial challenge for 21st-century undergraduates is how and when they learn not what they learn. There is, therefore, a need to comprehend more profoundly how undergraduates learn at ease. The information gained could be used to appraise formal and informal education settings.

Some of the mobile technologies used by students include laptops, netbooks, e-readers, tablets, and Internet-capable handheld devices. A study by Seeler and Hahn (2011) informed that undergraduates mostly use the internet on their mobiles to check

news or weather information, among others, e-mail, and social networking websites. With a purpose to identify the use of mobile technology, Vassilakaki, Moniarou-Papaconstantinou, and Garoufallou (2016) used a questionnaire to draw relevant information from LIS undergraduates in Greece. The finding showed that laptops were used to perform a related academic task like accessing library services, OPAC, reference materials and journals. Others include using maps (to discover places, get directions, or plan route), instant messaging, conducting personal business (such as banking and shopping), streaming music, downloading/watching videos or playing games online, follow or update micro-blogs (Twitter, LinkedIn among others), read or contribute to blogs and watch mobile television.

Mobile devices typically denote portable and cheaper devices Internet connectivity (Beal, 2015). They are used for storing, accessing, creating, modifying, organising or manipulating data in different formats and locations, fit comfortably in pockets and run on rechargeable batteries. They are often seen as an extension of personal computers and laptops. The three categories of mobile devices, according to Beal (2015) are Personal Digital Assistant (PDA), Smartphone and Tablet PC. PDA also called a pocket computer is a handheld device that integrates telephone, computing, networking functions, fax and Internet into a portable device. PDA functions as cellular phones, fax senders, web browsers and personal organisers. Most PDAs use the stylus for writing, have voice and handwriting recognition technologies. Examples include Palm Pilot, Revo, Hewlett-Packard Jornado, Sony Clie, Toshiba Pocket PC, Compaq iPaq and Casio Cassiopedia (Beal, 2015).

The smartphone is a mobile-technology that pools the functions of handheld phone and computer into a device that allows access (for example e-mail), store information and applications (IGI Global, 2016). Smartphones also have some PDA functions. Examples include the Nokia T-Mobile Sidekick, Samsung Galaxy, Sony Ericsson, Palm Treo, I-mate, Blackberry, Apple iPhone, Motorola Q, E-Ten, Microsoft, and Nokia Lumia and HP iPaq. Tablet PC is a notebook computer with an LCD touchscreen and is operated using fingertips or stylus. These computers make use of text recognition software that converts handwritten text to standard text. More so, there are Tablet PCs that have an additional option for input like the use of a detachable keyboard. Examples include Apple iPad, Samsung Galaxy Tab, Amazon Kindle Fire HD, Lenovo Yoga and Samsung Nexus.

All the mobile devices use a mobile operating system (MOS), a software platform on which other programs run. The MOS defines the utilities and features available on a particular mobile device. These features include e-mail, thumbwheel, keyboards, WAP, text messaging, synchronisation with applications and others. Among the common MOS are Apple iOS, Palm OS, Google Android, Mobile Linux, Windows Phone and Symbian OS.

Wylie (2016) opined that mobile technology had had an insightful effect on the ways students are learning and allow undergraduates to use technology in the lecture hall, in the hostels, in the library, at home and everywhere. Prensky (2001) had earlier noted that students had changed radically. Undergraduates of today are different from those for which the earlier educational systems were designed. He explained further that undergraduates of today are 'digital natives,' with daily exposure to an amount of technology that was ever thought possible. Besides, studies have underlined the academic potentials of mobile technologies in the learning process. Wylie (2016) also asserted that using mobile devices enhances undergraduate engagement and inspiration to learn and this could positively impact their academic performance. Undergraduates are more engaged in learning when using mobile technology because they are used to interacting with it. There are mobile applications (popularly known as 'mobile apps') used by students on their mobile devices. For instance, free apps downloads popularly used by students include the Dictionary.com for dictionary and thesaurus, Quick Graph for plotting equations, Google Earth to explore the world, Kindle app and iPod for e-reading, Story Kit to create stories and the NASA app for latest space missions (Wylie, 2016). Others include Microsoft office mobile, Google Drive, Skype, Coursera, Vocabulary builder and Dropbox, among others.

Reports have also shown that mobile applications are engaging as well as instructive (Lynch, 2015). This observation was underlined by a study that investigated undergraduates of on mathematics at Abilene Christian University, who used an iOS app called "Statistics 1". The report showed that the app inspired the students to complete lessons on mobile devices faster than they would have done using traditional textbooks and workbooks. The finding of the study further showed an enhancement in the final grades of the students (Lynch, 2015).

West (2015), in a study, examined how mobile devices could improve learning, students and teachers engagement, discoursed that mobile technology facilitates access to new content and provides information wherever students are located. Mobile

technology makes it possible to personalise educational materials as students seek information that is relevant to their interest around the clock using their mobile devices. The report disclosed the readiness of the undergraduates to use technology for learning and concluded that with the improvements in ICT, mobile technology could accelerate students' learning by joining massive amounts of information from the web with students' interests.

An experimental investigation by Ozcelik and Acarturk (2011) revealed that mobile technologies provide an opportunity for students by bringing together online and printed course materials. Dukić (2015), in an online survey of LIS undergraduates and postgraduates at the University of Hong Kong on using smartphone for academic purposes in tertiary education, concluded that although the LIS students frequently use the smartphone for personal needs, socialising and entertainment, they also use it for academic activities. Some of the academic activities include searching and reading relevant information materials, watching educational videos and interacting with fellow students. Meanwhile, some barriers encountered while using the smartphone for academic learning were identified as too long loading time, incompatible websites and small screen of smartphones.

Recent research, carried out at the Central Universities, Uttar Pradesh State, India by Sharma and Madhusudhan (2017) on mobile devices used explicitly by LIS undergraduates in daily life revealed that smartphone is the most used mobile devices. Concerning apparent usefulness of mobile devices for academic activities, productivity tools such as Word processing were used in documents creations. The study further shows that the most frequently used mobile apps are Gmail app, PDF viewer, Google app, adobe reader and Whatsapp, while the library website is accessed by most of the LIS undergraduates using their mobile devices. Thus, mobile technology can improve learning and academic performance of undergraduates because it facilitates access to information sources that are available online.

Similarly, Fabian, Topping, and Barron (2016) highlighted the possible benefits of mobile technology use in learning as follows; encourages pervasive education, improves social interactions, and enables personalised experience in learning. Invariably, mobile technology use in higher education has increased remarkably over the years. With the increasing introduction and use of new forms of technologies that allow distributed collaboration for mobile, Internet and social software, there is a paradigm shift in the way technology is used in the educational setting and for learning.

Thus, the growth of mobile technology has occasioned a shift in the academic environment, from traditional to mobile learning settings.

In Nigeria, studies have also shown the usefulness and adoption of mobile technologies for learning. Adegbija and Bola (2015) investigated 182 undergraduates in three universities in Kwara state, Nigeria. Data was collected with a questionnaire and the findings indicated that there was no difference in the perception of both genders on the adoption of mobile technology for learning. Omolade and Opesade (2017) explored factors that could influence the use of mobile applications by 1,105 students. The study revealed that Facebook and Google play are the most used app, and the apps are mostly used for social networking, news and educational activities. Lateef, Adebanjo and Ibrahim (2020) in a study that involved 400 students in South West Nigeria found that ease use and perceived usefulness of mobile technology significantly contributed to the adoption for learning.

2.4. Library information resources use by undergraduates

Academic libraries have over the years enjoyed the status of being the "heart of the university" (Association of College and Research Libraries (ACRL), 2010). However, university environments have changed over the decades and stakeholders have varied expectations and goals. The library, a place to gather and collect information, symbolises the core educational values in different domains of pursued by faculty members and the undergraduates (Tella, Owolabi and Attama, 2009). The library must, therefore, demonstrate value in complementing the university in achieving these expectations and goals (ACRL, 2015).

Many studies have evaluated library information resources use by undergraduates. A research was conducted by Shrestha (2008) on library resources use and self-efficacy of undergraduates in three universities in Nepal. Data was collected from 127 full-time 200 level students with the using a questionnaire. The findings showed that the undergraduates need guidance in library resources to use as the most commonly used sources of information are library textbooks, electronic journals, and the Internet. She further observed that many of the students used only electronic formats of information, thus choosing convenience over accuracy. Evaluating library information resources use by 3120 students at Koforidua Polytechnic, Owusu-Acheaw and Larson (2014) discovered that most of the undergraduates (82%) were cognisant of the available library resources, but only slightly more than half (58.6%) made use of the

resources effectively. They concluded that students lacked exposure to library information resources and suggested that information literacy courses should be included in school curriculums.

Strang (2015) explored the circumstances that made undergraduates decide to use available library resources for research and assignments and highlighted seven reasons. Most importantly is the access to massive resources either through the library or at the library and opportunities to read books and journals in print or electronic formats. Although students use the Internet, they prefer to use resources that are made available by the library to get information as they trust the quality of those resources. Undergraduates also find it easy and convenient to look for information in the library. Students can find accurate and reliable information through libraries' online resources. The students could easily ask for assistance from the library staff that can answer their questions and directs them to the needed materials. Students also chose to use the library because of the conducive and enabling environment to study and do research, opportunity to accurately cite the information resources used and availability of Internet and Wi-Fi facilities that make studying easier.

In Nigeria, Jamogha, Jamogha and Godwin (2019) investigated how ICT skills could influence the use of library information resources by 407 undergraduates in two universities. The findings revealed that although the ICT skills possessed by the undergraduates were high but the use of electronic library information resources was low. The undergraduates use more of print textbooks, reference materials and monographs. In contrast to this findings, Ayim (2019) study, which was carried out among 366 undergraduates at the National Open University of Nigeria, Dutse, Abuja centre showed that undergraduates used the available electronic library resources for research. The study noted lack of adequate information retrieval skill as one of the problems associated with the use of the information resources.

2.5 Web-searching behaviour and academic performance of undergraduates

The World Wide Web (www), popularly called 'the Web,' has been enthusiastically accepted and integrated into several activities by schools, administrators, teachers, parents, and students as far back as the mid-1990s (Ebersole, 2005). The potential as the source of rich information and an information retrieval tool for university education is beyond question (Malik and Mahmood, 2009; Civilcharran,

Hughes and Maharaj, 2015). The role of the web and ICT, according to Aitken (2007) in education and research, keeps growing and changing. WWW is defined as a connection of pages of information put together around the globe containing text, pictures, audio/video clips, among other things. The web includes pages of publicly accessible information which continue to grow at an exponential rate. Web pages are linked together by hyperlinks making it possible for search tools and browsers to retrieve them quickly. The explosion of information resources through the web has increased the interest in the exploration of information behaviour within the LIS field.

The web provides more current information than books. Articles published in journals, newspapers, magazines, and eBooks are readily available through the web. Unfortunately, the web lacks bibliographic control. Reports on web-searching behaviour became available in the mid-1990 and had ever since multiplied. Cmor and Lippold (2001) research on the web-searching behaviour of undergraduates put forward the following observations: the web is used for many things, they could spend minutes or hours conducting a search, have varying searching abilities, often believe they are more skilled than they are and again, rate peer-reviewed journal articles and discussion lists as the same. It is, therefore, necessary for undergraduates to be able to determine the most efficient ways to locate materials relevant to the information they seek for, which is an integral part of a successful web search.

Many of the studies conducted on web-searching behaviour of university students did not directly relate to academic performance. The reports were not directly on web-searching behaviour analyses but inferred those who performed a search on the web, the performed tasks, how they perceive web search tools, and the search tactics used. These reports gave insight into factors that could influence the search behaviour of users while using the web. For instance, a survey by Twidale, Nichols, Smith, and Trevor (1995) carefully took into consideration the role of collaborative learning when searching for information. Through related literature quotations, they identified common search problems connected with information retrieval to include the following: no or too many hits; recurrent errors; little tactic difference and inability to locate relevant records. These findings inspired the development of Ariadne, the digital archiving online journal.

However, the exact searching issue the development of the online journal was able to deal with was “errors made in searching” (Twidale *et al.*, 1995: n.p.). This searching issue shows how typo errors in a well-formed query could lead to little hits, which could eventually cause discarding the strategy. More general clarifications

indicate that undergraduates working in groups of two to four persons using a single workstation exhibit quite a few relations that are collaborative among themselves. Other observations include discussions of individual ideas and plans for next moves among the group members, adjacent group/individual members working together, explaining the course of actions, outcomes comparison, and at times competition to find information, sometimes asking for help from neighbours, and monitoring each someone else activities in the different workstations.

Grace-Martins and Gay (2001) examined the browsing contents of students of two different programmes at Cornwell University, United States of America. They found statistical evidence that browsing contents predict the academic performance of the undergraduates. Web browsing on laptops was recorded, quantified and interrelated with the academic performance of the undergraduates. The browsing sessions of the undergraduates correlated positively with their final CGPAs. Although searching the web during lectures or classes leads to lower grades, they observed that forcing the students to focus on using recommended contents and applications boosted the achievement and productivity of the students. Researchers (Soloway, Grant, Roschelle, Berg, Tinker, Mills, Resnick, and Eisenberg, 1999), who were known education technologists, had earlier anticipated this and recommended the use of purpose-driven electronic devices during classes like a tablet equipped only with resources, applications and software for educational purposes versus laptops/computer systems used by undergraduates with only generic applications and software like word processors, spreadsheets, web browsers, among others.

Comunale, Sexton and Voss (2002) discovered proof to support the opinion that higher CGPA were correlated to more regular use of the web in exploratory research, involving 106 students that described the effectiveness of course websites among undergraduates and postgraduates in Accounting and Business Statistics. The undergraduates check their results and emails regularly through the websites and also have access to the course curriculum and class notes. Take-home exam, discussion forum and exam review sheets were also made available on the platform for the students. Apart from higher grades in the courses and improved learning, students found that these course websites facilitate communication among themselves and their lecturers. The researchers also noted that the course websites offered lecturers appealing opportunities that enhanced their courses and improved the usefulness of the information they provide the students. However, some tutors believed that relative to the required effort in creating

and maintaining high quality and useful course website, the benefits are overstated (Comunale *et al.*, 2002).

Exploring the different sides of web-searching behaviour of undergraduates, Punjab, Malik and Mahmood (2009) discovered that undergraduates perform their entire search for academic activities using the web. However, they gave priority to basic search using known search engines and were pleased with the information retrieved. The report also revealed that undergraduate encountered problems like inability to find information that is relevant, information overload and slow pace in the course of a search. Moreover, since many of the search engines are indexed and make use of as thesaurus classifications and controlled vocabularies, most undergraduates were unable to productively or successfully locate information on the web

Seeking a connexion between the web-searching behaviour and the academic performance of undergraduates, Ebersole (2005) reviewed studies conducted in 1998 and 1999 by examining the perception and web use by undergraduates for academic activities. The content analysis of website visits of undergraduates implies that they consider the web as a valuable and essential source of information. Examining the various features of web-searching behaviour of undergraduates, Malik and Mahmood (2009) considered their background, experience on the web, reason for use, search skills, formulation of a query, frequency of use, and commonly used search engines. Data were collected from 200 undergraduates in a faculty, in the University of Punjab, Lahore, with the use of a questionnaire. They found that these factors contributed to how students search the web. Also, Google was the first choice among the search engines when the students used the web for academic activities.

Rieger (2009) examined the type of support derived from search engines by lecturers and undergraduates of Cornell University to teach, learn, and research. Academic activities supported by search engine use were explored to examine the variations in the use patterns, search results satisfaction level and search engines used for specific tasks. The findings revealed differences in using search engines among the lecturers, graduate and undergraduate students studied and overall level of satisfaction with the search results. Web search engines were also found to support undergraduates' studies and research. However, there was a general belief that students do not understand how search engines work and had difficulties in evaluating search results and sources, which invariably limits their capacity to effectively use them (Civilcharran, Hughes and Maharaj, 2015).

Investigating academic performance, information seeking behaviour and self-efficacy (academic) of 295 vocational students in Taiwan, Zhu, Chen, Chen and Chern (2011) linked effort to time spent on the web for information seeking relating to academic activities. The study revealed a positive influence of information seeking on academic performance which was mediated by academic self-efficacy. Undergraduates with low academic self-efficacy benefitted more as their information seeking activities on the web greatly enhanced their academic performance.

Bhattacharjee (2014) examined the web-searching behaviour of Silchar Medical College library users in terms of the demographic background of users, ability to use the web, the frequency of use, the reasons of use, search skills and techniques, level of satisfaction, favourite search engine and influence on academic success among others. The study used descriptive research design, and data was collected from 300 library users using the questionnaire. The data collected revealed that web use met the information needs of the library users and the web facilities enhanced their academic excellence by providing access to current information. The results also revealed that web-searching behaviour of the library users impacted their information searching and update of knowledge relating to their course of study.

Undergraduates are often attracted to the web because it provides information in a variety of formats which are now easily accessible, primarily through mobile technology use. They have easy access to pictures, videos, music and text in a multitude of subjects, anywhere, anytime. The web, therefore, is considered to be a potentially powerful means of enhancing the academic success of undergraduates in the university. There are also evidences that web-searching behaviour could predict the academic performance of undergraduates. Grace-Martins and Gay (2001) found that the frequency and duration of browsing sessions of undergraduates in Cornwell University, United States of America, correlates with their final grades. Bhattacharjee (2014) also reported that web facilities enhanced the academic performance of library users by providing them access to global information. There was an increased dependency on the web for educational purposes by undergraduates who use the library and the information resources. These indicate that web-searching behaviour could influence academic performance, but the perception of undergraduates of the web as a valuable source of information will determine how it is utilised for academic activities.

Civilcharran, Hughes and Maharaj (2015) carried out a study in South Africa to categorise the search strategies used on the web by postgraduates to deal with some

weaknesses identified with the web search strategies of undergraduates of the University of KwaZulu-Natal. Qualitative and quantitative information were taken from 331 respondents. The findings revealed that the postgraduates preferred low-level web search tactics and the majority of the respondents are intermediate or expert web users who acquired their web-searching knowledge through experience. The researchers had earlier noted that the most commonly used web search strategies among the undergraduates are those associated with Internet usage and not academic usage. This observation constitutes a problem as undergraduates are expected to use academic sources. Researchers (Bhatti, 2014; Civilcharran, Hughes and Maharaj, 2015) therefore suggested training at an undergraduate level to create exposure to information retrieval methods. This training will expose undergraduates to different ways of retrieving information which includes right from the beginning of their education. Such methods would include how to use meta-search engines, Boolean operators and recover information from the invisible web.

2.6 Mobile technology use and academic performance of undergraduates

Technology has brought various revolutions that are embraced in the training of undergraduates and Nigeria, and digital environments are emerging daily. The 21st century has seen advancement in the development of mobile technology, and as such, mobile technology, together with connection to the Internet, are recognised and continually utilised for learning. There are great diversities on how frequently technology is use, the kind of technology implemented, and the disposition to integrate technology into learning (Twum, 2014). Undergraduates are living in a digital world, and daily, they engage in technologically based activities such as sending short messages, sharing of photos and videos, use of social networking tools, podcasting, and blogging (Looi *et al.*, 2010). Cell phones are used for picture taking, uploading and sharing of information, creation of blogs as well as accessing the web without any time constraints in addition to making calls.

Mobile technology can enhance the academic performance of students by providing a learning experience that involves collaboration, accessibility, and integration beyond the classroom. According to Attewell and Savil-Smith (2003), as cited in Twum (2014), mobile technology facilitates students' motivation, develop their organisational skills, encourages studying independently and learning collaboratively, serves as a referencing tool, tracks students' progress and delivers the assessment of the

students. Other benefits include easy access to contents, integration of different instructional activities, support for self-regulating study and the undergraduate organisation encourages student interest and assists undergraduates in retrieving information from the web.

Utilisation of mobile technology and applications could be valuable in increasing the expertise and self-regulative learning ability of the undergraduates. Technology-rich activities have been established to readily and deeply engage undergraduates and also encourage collaboration in contrast to less technologically oriented activities (West, 2013). Real-time chat among undergraduates improves communication and cooperation, through which they can use or create information personally and collectively. Mobile technology has the ability and functionalities to enable and support personal and direct communication in and outside the classroom.

The appropriate uses of mobile technology can positively influence the academic performance of undergraduates. Research on how university students perceive mobile phone as a learning aid in Pakistan by Naqvi and Bhamani (2014) discovered that undergraduates spend more on mobile phones using a variety of applications on the phones. The findings also showed that they make use of their mobile phones daily, and noted further that the use of mobile phones to retrieve information had removed learning barriers. Reports from UNESCO according to Telbis (as cited in Naqvi and Bhamani, 2014) revealed that mobile phones are not just communicating tool but could be instrumental to improve the ratio of literacy all over the world, specifically among females. Murphy, Faley, Lane, Hafeez-Baig and Carter (2014) looking into the unique opportunities provided by recent developments in mobile technologies at a Southern Queensland University, studied to understand how undergraduates utilise mobile devices to enhance learning. They developed a survey instrument used to collect information from 186 participants. Upon analysing the data qualitatively, the result showed that the undergraduates predominately used laptops to support their studies but also use their smartphones and tablets for other learning activities.

In experimental research involving wireless network access and having the student's web browsing recorded, Grace-Martin and Gay (2001) discovered that the presence or lack of pervasive access to the network may meaningfully determine the use of laptops by undergraduates. Moreover, the report shows that unlimited web browsing lowers student’s final grades but that reducing network access in specific contexts will necessitate the undergraduates to focus on the content and applications inputted or

recommended by the instructor thereby improving their achievement. This observation is in agreement with the suggestion by some education technologists about the need to have computing devices that are for specific purposes in the classroom. For example, outfitting a PalmPilot with only software and a sensor probe for collection of data for daily lessons as against laptops with applications that are for all-purpose like word processors, powerpoint, browsers among others for undergraduates use (Soloway *et al.*, 1999).

Campbell (2006) reported that browsing the Internet for handy academic information and accessing thesaurus or dictionary on the mobile phone by students could improve their academic performance. Furthermore, he observed that using the mobile phones by students in the University of Southern California enabled them to stay connected with their lecturers and fellow students, which helped them in solving academic problems, thus enhancing learning. Apart from that, Naqvi and Bhamani (2014) noted that the joint influence of educational and technological platforms had created environments for handheld education, which is considered as a new learning system.

The influence of iPads on undergraduates' academic performance was investigated for three years at the University of Texas, El Paso (UTEP). The findings established the fact that mobile technology could definitely impact the academic performance of undergraduates if appropriately used (UTEP, 2013). They gathered data from undergraduates in 100 level in the University that registered for courses that acquaint the new students with the campus and its resources. Over 108 students were surveyed at different times during the semester to determine their level of acquaintance with the technology and their interest to use it academically. The research findings showed that there was about 10 per cent increase in the grades of students who use iPad and also interestingly when the iPads were used without supervision, the grades reduced drastically.

Another study conducted in the United States (Dahlstrom, Dziuban, and Walker, 2012) by EDUCAUSE Centre for Applied Research (ECAR) also reported similar findings to that of UTEP. The study which has participation from more than 100,000 students from 195 institutions reported the critical role played by technology in the education environment by generating a means of connectivity between the students and the university, the lecturers and the academic community. One of the UTEP researchers opined that "studies such as this one are significant and useful to the

academic community" (UTEP, 2013: n. p.). The reason is that data generated on the effectiveness of different teaching methods could be of benefit to lecturers looking for ways to enhance their teaching methods. It could also provide an improved educational experience for the undergraduates. The findings also revealed that students are interested in classes involving mobile technology because of the versatility and usefulness and specifically, the iPad helped with problem-solving, note-taking and presentations especially for those who did not own a laptop.

Coffin and Lyle (2015) also reported the findings of the University of Washington, one of the 250 institutions involved in ECAR annual survey. The study which examined undergraduates with over ten years technology use experience revealed that possession of mobile device and its use for learning remarkably increased between the years 2013 and 2014. The findings further showed that students perceived mobile technology to be essential for enhancing their academic success, although they experienced some difficulties concerning mobile interfaces that lacked functionality and usability.

In Nigeria, Tella and Salman (2011) examined the perception of LIS undergraduates in the University of Ilorin, on the influence of mobile technology use on learning. The finding showed that 75% of the 117 students used for the study perceived mobile technologies to have contributed immensely to their learning and that, through the use of mobile technologies, their GPA has improved. The researchers concluded that having access to and using mobile technology had improved the students' academic performance more than the face to face class lectures. Consequently, they recommended that universities should encourage mobile technologies to use by lecturers and the undergraduates as this is proven to contribute to students learning and academic performance.

Conversely, there exist some undesirable impacts of using a mobile phone by undergraduates. Javid, Malik and Gujjar (2011), in a study consisting of 390 students, conducted in Pakistan by Islamia University of Bahawalpur, to observe the influence of using mobile phones on the academic performance of undergraduates, opined that mobile phone distracts undergraduates while in the classrooms. Students may lose focus on their studies while connected to the Internet, and this may harm their academic performance. Students could also lose their phones, and this may result in negatively affecting their studies. The study also revealed that mobile phones are described as the primary source behind declining moral values (Naqvi and Bhamani, 2014). A student

might be elsewhere but lie to his/her parents that he/she is at the library. Kibona and Mgaya (2015) surveyed 100 students at Ruaha Catholic University, Tanzania, to investigate the effect of smartphone use on academic performance. They discovered a negative relationship concerning high academic performance and smartphone usage. They however suggested a need to assess of how smartphones can be used for education by undergraduates to have a better understanding

The use and influence of phones with Internet capabilities on the academic focus of 215 undergraduates at the University of Ibadan, Nigeria, was studied by Ezemenaka (2013) using questionnaire and in-depth interview. The findings revealed no significant influence of phones with internet capabilities on the undergraduates' academic performance. Soyemi, Oloruntoba and Okafor (2015) examined the effects of Internet-enabled mobile phones used during class hours on undergraduates' academic performance in higher institutions in Nigeria. Data was collected from 60 undergraduates through extensive interview and structured questionnaire. The findings were found to be in line with the existing literature. Use of mobile phones during class hours negatively impacted the academic performance of the undergraduates. The students were more focused on chatting or listening to music at the expense of their class academic activities.

2.7 Library information resources use and academic performance of undergraduates

The academic library plays a role that is germane to the academic experience of undergraduates with the provision of access to varieties of information resources. As part of their mandate, one primary expectation from academic libraries is to make access available to information resources on and off-campus. Furthermore, to ensure that users have access and use the available information resources, the library make available facilities and services as well as a conducive environment for reading and consultations. Academic libraries are to provide support towards the achievement of the objectives of the host university as they provide essential educational resources to the academic community and help in fulfiling the needs of the curriculum to support learning and research (Rathinasabapathy, 2005). Thus, fundamental purposes of the library even from the onset, is to help users with information, ascertaining the value, teaching and learning, and supporting the processes of research.

Evidence abounds of the encouraging contributions of the library to the academic performance of undergraduates. Assessment in action project showed that undergraduates that used the library in one way or the other, for example, accessing online databases, interlibrary loan, achieved good grades than undergraduates who do not utilise the library (Association of College and Research Libraries, 2017). Kot and Jones (2015), in a research at Georgia State University, demonstrated that using information resources available in the library has a desirable impact on the academic performance of the undergraduates. Earlier studies conducted overseas (for example, Wong and Webb, 2011) lent credence to this submission. Academic libraries and organisations acquire and save an increasing amount of electronic resources, which undergraduates are expected to access on the web. How information experts organise the resources utilising metadata or planning the layout of a digital library, determines the processes for retrieval, access, and information used by undergraduates.

Studies have shown that academic libraries recognise the importance of the academic performance of undergraduates (ACRL, 2017). There is a general belief that the library supports students' academic performance and researchers have suggested investigations into the connection concerning the interactions/use of the library by undergraduates and their GPA (ACRL, 2010; Lance, Rodney and Schwarz, 2010). One of the earliest studies, Kramer and Kramer (1968), researched the association between the grades and retention of freshmen students at California State Polytechnic College, Pomona and library borrowing data. They discovered positive associations between higher grades, retention and borrowing library materials. Most research in recent time used extensive national data as measure of library influence on the higher education sector (Kuh and Gonyea, 2003; Gratch-Lindauer, 2007; Emmons and Wilkinson, 2011). The subjects of the studies were single institutions and concentrated mostly on library information resources use and grades of undergraduates to determine the academic performance (Goodall and Pattern, 2011; Wong and Webb, 2011).

Studies have also shown that library users could predict the academic success of undergraduates uniquely. At the University of Cape Town in the 90s, a study by De Jager (1997), South Africa showed that the numbers of books borrowed by undergraduates correlated positively with their course grades. However, the limitation of the study was that only 240 undergraduates and just two courses were studied. Later in the 2000s, De Jager (2002) further attempted to investigate how library use contributes to the academic performance of humanities undergraduates. The outcomes revealed that

frequency of use of the library by the undergraduates significantly correlate with better performance in their examinations.

Meanwhile, Goodall and Pattern (2011) faulted the approach used in the study. In their opinion, they prefer the use of two or more groups of undergraduates that have the same capability, experiences and access to resources to observe the impact of frequently using of library resources and significant improvement in grades. Laird and Kuh (2005) used the data generated by the National Survey of Student Engagement (NSSE) to tested the association between the use of information technology (IT) and various forms of students' engagements. They discovered that the interactions of students with IT and activities that are related to the library, for instance, checking up academic information resources on the library's website or seeking for help from librarians among others, correlated positively and moderately with student engagement and performance. Collaborative learning was enhanced by IT use of the students while interactions with the librarians encouraged the students to work harder to meet up with their instructors' standards. Researchers have also noted that citation behaviour could influence student's grades. Robinson and Schegl (2004) discovered strong association amid citation behaviour and marked scored in assignments but Wong and Webb (2011), however, noted that the relationship might not be due to the quality of the cited references but the number of citations.

Hamade and Al-Yousef (2010) examined information resources use by LIS postgraduates at Kuwait University by the use of citation counts of references in their research papers in order to attest to the importance of the access provided to information resources by academic libraries. The findings revealed that web pages, books and journal articles are mostly the preferred information resources by the students. Wong and Webb (2011) observed a significant relationship between GPA of undergraduates at graduation and the number of books borrowed from the library by the students. The study was carried out because they noticed that few studies measure the connexion between students' library use and academic performance even though literature abound about its importance. According to Wong and Webb (2011), university and library administrators understand the necessity for libraries to found the relationship between the way undergraduates use the library and learning outcomes. Raising pertinent questions like, "is there a positive difference in the performance of undergraduates who use library information resources actively to those who use it casually?"

For this reason, rather than using the customary academic library assessment, Wong and Webb (2011) reported an experimental project undertaken by the Hong Kong Baptist University Library (HKBU) by sampling up to 8,701 pairs of data. The library demonstrated its constructive impact on the academic performance of students by establishing a significantly statistical connection between library materials use and the CGPA of undergraduates. A strong association was also discovered by Cox and Jantti (2012) between library information resources use and student grades at the University of Wollongong Library. The investigation was carried out by analysing resource usage data for book loans and online resources used by the undergraduates in the University using a database called 'Library Cube' which was used to link library use, demographic and academic performance data of the undergraduates.

Soria *et al.* (2013) provided proof of the significance of the library towards learning outcomes and retention of undergraduates through a research at the University of Minnesota. The research showed that first-year undergraduates who regularly made use of the library in the first semester achieved higher CGPA than those who did not. In addition to this, the various library services used by the undergraduates had different impacts on their academic performance. Precisely, services and resources offered by the library are; library workstations use (signifying physical visit to the library), online databases accessing, electronic journals use, and borrowing books significantly correlated positively with the academic success of the undergraduates (Soria *et al.*, 2013).

Studies by Knapp and Barkey (as cited in Soria *et al.*, 2013) at the Monteith College Library, have also demonstrated associations and positive relationship between attendances at library skills programmes, checking out books, undergraduate' grades, and higher grade point averages. Jato, Ogunniyi and Olubiyo (2014) also opined that studies have indicated that strong link exists between students' library use and academic performance. This notion was affirmed in a research conducted in selected secondary schools in Ondo West, Nigeria, students who used schools libraries perform better in tests and examinations than those who do not. They cited studies conducted in Ohio, USA and Australia in which students believe that the library, staff and audio-visual shows contributed to their success while in school.

Saurina, Kelly, Montenegro, González, Jara, Alarcón and Cano (2014) examined the connection that academic performance of undergraduates have with the use of library information resources at Pontificia Universidad Católica de Chile (UC). They correlated

the number of loans, digital resources access and academic performance of the undergraduates using three databases namely; ALEPH (the university integrated library loans database), EZproxy (electronic resources) and DARA (academic records of undergraduates). The report of the research was tandem to what is obtainable in the literature. Library information resources use predicted the academic performance of the undergraduates. There was an improvement in the GPA of undergraduates that accessed and used electronic library information resources through the EZproxy.

Brown and Malenfant (2015) noted that higher education effectiveness and quality of LIS undergraduates is increasingly becoming a concern for academic libraries. The academic libraries contribute to assessments in the universities by documenting the values of academic libraries through the creation of approaches, strategies, and practices, hence, promoting their institutions' goals and missions. They noted further that academic libraries could establish the relationship between the various aspects of the library services (for example, library instruction programmes, reference services, space facilities, and collections) and factors that influence academic performance (for example, undergraduates' engagement and retention, CGPA, graduation, and career awareness). This relationship will afford an evidence-based demonstration of the various contributions of libraries to the education and success of undergraduates.

Association of College and Research Libraries (ACRL, 2017) in the team project "assessment in action" which comprised of 55 higher education institutions in North America, demonstrated the relationships between the library and undergraduates' academic success. Firstly, undergraduates, who received library instruction as part of their courses, demonstrated better information literacy competencies and achieved higher grades than those who do not undertake library instruction courses. Secondly, the social and academic relationship among students is fostered by library spaces and research rooms. Thirdly, the use of instructional games in the library was to develop undergraduates' engagements, information literacy skills, and the attitudes of the undergraduates toward the library and the staff.

Moreover, the team-based project emphasised social media use in promoting library information resources awareness among undergraduates while several sessions and activities on library instruction could be more effective than just a single session. Lastly, instructional activities and services organised collaboratively by the library and other academic units in the University (for Example, writing centre, learning skills, and coaching services) were found to enhance student learning and success. Thus, as rightly

stated earlier by Wong and Webb (2011), university libraries, especially in the developing countries, must demonstrate the contributions of library use to undergraduate learning outcomes empirically and regarding the effectiveness of the university.

2.8 Web-searching behaviour and mobile technology use by undergraduates

The explosion of mobile technology has brought a significant change to the way information is accessed. They enable communication while physically in motion and have become a dynamic device of all the time, providing millions of users' access anytime to the information resources on the web (Lui, 2015). The popularity of mobile technology, according to Kukulska-Hulme (2010) is establishing "a distinct culture where learners repeatedly use mobility and awareness of their immediate context as starting points for keeping social contact alive, accessing fresh content, getting local information and becoming visible as creators and producers of content" (p 9). Mobile technology is influencing the way undergraduates seek, search and use information. Spezi (2016) observed that current research on web-searching behaviours are focused on the changing ways undergraduates seek for information which are brought about by the use of the Internet, social media, and mobile technologies.

Using mobile devices in accessing the Internet while seeking or searching for information is common among undergraduates in this century. Whereas searching for information within search sites is an everyday activity on the mobile. Kaikkonen (2008) report indicated that activities such as news, weather information, surfing bookmarked websites, checking e-mails and blogs on the web, are also prevalent among mobile Internet users. Kassab and Yuan (2013) corroborated this when they discovered that lack of access to the network on a computer, ease of searching for information and opportunity to interact or have a conversation or an argument motivated undergraduates to access the Internet using mobile devices.

Furthermore, the pilot study conducted by Kassab and Yuan (2013) was to explore the reasons for accessing and acquiring information employing mobile phones or other small-screen devices by users using interview protocol as the primary research instrument. Data gathered on the searching behaviours and information needs of twelve undergraduates while using mobile devices were transcribed and analysed. The findings of the in-depth interview showed that the undergraduates as a mobile user have different perceptions about the various aspects of their mobile use habits relating to choice of

devices, what motivated them to use the internet on mobiles, their search behaviour, mode of presentation of search results, and information security awareness. Thus, the authors concluded that information searching on mobile devices is agreeably an essential aspect of the daily routine of students. Liu (2015) studied information searching and seeking behaviour of 205 undergraduates in the mobile environment. The survey, conducted in China revealed that almost all the undergraduates own a smartphone and they frequently use it for reading and other information activities.

2.9 Web-searching behaviour and library information resources use by undergraduates

It is a common understanding that undergraduates in this modern century have never lived without Internet connectivity which they depend on to carry out several activities, whether academic or non-academic (Purdy, 2012). The utilisation of library information resources can take up an essential role in the education of the undergraduates. The knowledge of the library as an essential source of information for academic activities encourages the undergraduates to go the extra mile beyond their course syllabus. Increasingly also, undergraduates prefer using search engines such as Google for locating information on the web to using library online catalogues or scholarly journal articles in databases. Kim and Sin (2007) findings on the perception and preference of information resources by undergraduate corroborated this assertion. They discovered that the online information sources preferred by undergraduates include search engines, ebooks, websites, online databases, and ejournals.

Furthermore, undergraduates assumed that information from search engines, websites, and friends/family could be used easily, while books, encyclopaedias, OPACs, and librarians were dependable sources of information. Selwyn (2008) focused on the engagement of undergraduates with the web as an information source for academic tasks surveyed 1,222 undergraduates. The diverse patterns of Internet resources selected by the undergraduates were explored in light of the extensiveness of use of the Internet, access and proficiency, study year, gender, age, ethnicity, and background of education. The findings demonstrated that utilisation of the internet by the undergraduates does not align with individual characteristics, dissimilarities in access to technology and expertise as opined by other researchers but gender and subject-specific. Universities, therefore, need to encourage web-based/online learning across all disciplines to make it attractive to undergraduates.

Martin (2008) as cited in Lacović (2014) examined the behaviour of 200 undergraduates at the University of Central Florida while seeking for information to investigate the information sources used for academic research and the impact of library instruction on sources used. The findings showed that although the students considered library information materials (such as journals and books) more reliable than Internet resources, three-quarters of the students search the web for class-related research. Lacović (2014) noted that students frequently use library information sources such as books, periodical articles, and online resources, although many undergraduates prefer searching the Internet to find educational materials. They have a preference for searching quickly on Google, navigating through remote libraries on the web and spending more time on materials downloading.

Studies, as opined by Lee, Paik and Joo (2012), have shown that undergraduates frequently cite journal articles than books, use more electronic journals than hard copies and have trouble separating scholarly sources of information from non-scholarly sources. They also have problems constructing and implementing effective search strategies, but for academic information, they rely more on the web because they believe that available resources through the web impact their academic performances positively since they could easily access the information provided by the web while engaged in searching tasks. Lee, Paik and Joo (2012) highlighted factors that affect the choice of library information resources by undergraduates to comprise of ease of access, use, exposure, consistency, free access, depth of the material, awareness, timeliness and experience of the user.

2.10 Mobile technology and library information resources use by undergraduates

An EDUCAUSE research by Dahlstrom, Brooks, Grajek, and Reeves (2015) revealed that technology is rooted into the lives of students, they, for the most part, have positive predispositions toward technology and more undergraduates own Internet-capable devices now than ever. Accessing library information resources using mobile technology is not a new notion which is brought about by the rapid increase in the number of Internet-enabled mobile devices owned by undergraduates. Thus, over the years, researchers have carried out surveys on mobile technology use in libraries (Dahlstrom, Dziuban and Walker, 2012; Dresselhaus and Shrode, 2012; Ward, Hahn, and Mestre, 2015). Cummings, Merrill, and Borrelli (2010) studied library users' use of

mobile devices to access the library catalogues. The investigation indicated that 45.2 per cent of the respondents, accessed the library catalogue on mobile devices with small-screens, regardless of whether they owned a device or not. Lippincott (2010) supported using mobile devices to provide access to contents to support reference services and also noted the need for diversity in the provision of mobile services. Dresselhaus and Shrode (2012) study further revealed the extent of mobile devices use by undergraduates for academic purposes. The study showed that at Utah State University, 54 per cent of the undergraduates use mobile devices for learning.

Reese (2013) studied the use of mobile apps on smartphones of 62 undergraduates registered for an information literacy course at the Carnegie Doctoral Research Extensive Institution, USA, through an online survey. The findings of the study demonstrated that undergraduates use smartphone apps for communicating, entertainment and more. Undergraduates utilise specific apps on hand-held Internet-enabled devices for information seeking. The undergraduates also used search engines, online encyclopaedias, and libraries apps. In addition, a substantial number (76 per cent) disclosed using applications to search for educational information. They used native apps on mobiles which allow seamless connections to prevalent academic websites that are on their desktop computers.

Ward, Hahn, and Mestre (2015) observed that mobile devices are an ever-present part of the contemporary undergraduate experience. Besides, evolution in mobile technology in the years to come will necessitate the incorporation of more cutting-edge features of mobile devices to boost the use of the information resources and spaces in the library by the undergraduates. Exploring how libraries might incorporate the perspectives and needs of the undergraduates into the workflow of the mobile development, the researchers organised a student competition in the University of Illinois to challenge the undergraduates to team up in designing mobile apps with specific features that could increase the use of library resources and spaces. The results of the competition proved that the undergraduates wish to access the library catalogue and personal account information through their mobiles. Interestingly, the teams took up the creation of the mobile app working independently. The result also provided a better insight into undergraduates' need of learning spaces in the library and approaches for the incorporation of mobile technology in their academic activities.

2.11 Theoretical Frameworks

The theories that are found to be related to this study are Walberg educational productivity theory, Ellis' model of information-seeking behaviours, Tsai and Tsai framework of analysing online searching behaviour, Media richness theory and Uses and gratifications theory. These were all reviewed in sections 2.11.1 to 2.11.5 and the implications of the frameworks presented in section 2.11.6.

2.11.1 Walberg Educational Productivity Theory

Several authors (Maehr and Sjogren, 1971; Beck, 1978; Sternberg, 1998) have proposed theories that serve as a foundation for understanding factors that impact undergraduate academic performance. One such tested theory is Walberg educational productivity theory (Walberg, 1981). Walberg in his submission identified eight factors that influence undergraduate's performance - student ability; motivation; the quantity of instruction; quality of instruction; education-stimulating conditions in the home; the socio-psychological environment of the classroom; peer group and exposure to mass media. These factors were grouped into two – essential and supportive factors. Academic performance of undergraduates was additionally described as a "multiplicative, diminishing-returns function of four essential factors - motivation, student ability, quantity and quality of instruction - and possibly four supplementary or supportive factors—the socio-psychological environment of the classroom, peer group , education-stimulating conditions in the home and exposure to mass media" (Haertel, Walberg and Weinstein, 1983:p. 76). The essential factors were described as required, but are inadequate on their own for classroom education, meaning that all the four factors are a minimum requirement. Any of these essential factors can be a replacement for the other or a trade-off for one another. For instance, enormous amounts of time may be necessary for a reasonable quantity of learning to take place if ability, motivation, or quality of instruction is inadequate (Haertel *et al.*, 1983).

However, according to McGrew and Evans (2004), the key variables that affect the academic performance of undergraduates as identified by Walberg are age/developmental level, motivation, ability/prior achievement of undergraduates, quantity and quality of instruction, peer group, classroom climate, exposure to mass media outside of school and home environment. The first three variables (motivation, ability and age) replicate the undergraduate's characteristics. The next two variables, (quality and quantity) indicate instruction, while the remaining variables (home

environment, classroom climate, exposure to media and peer group) signify aspects of the psychological environment.

Characteristics of undergraduates are essential for academic performance but are a minute portion of the learning equation. Research showed that quality and quantity of instruction, student's characters, motivation as well as psychological environments are well-established factors that influence learning outcomes. More specifically, psychological environment variables influences about 92% of the time students spend outside class (Walberg, 2003).

2.11.2 Ellis' Model of Information Seeking Behaviours

Ellis (1989), Ellis, Cox and Hall (1993), and Ellis and Haugan (1997) proposed and elaborated broad information seeking behaviour model built on researchers study on the information seeking patterns of scientists and researchers in social sciences, physics, chemistry, engineering and industrial firms. The model described six generic characteristics of information seeking activities as; starting, browsing, chaining, monitoring, differentiating, and extracting, as shown in Fig 2.1. When searching the web for information, starting encompasses actions that form the beginning of the search, identification of sources that could be of interest as the beginning points for the search. The recognised sources, most times, consist of sources that were used in the past or non-familiar sources that are likely to offer related information. Perceived ease of access and quality of information from the identified sources will determine the probability of the selection of the sources. Perceived ease of access, which is defined as the length of time and extent of effort needed to make locate, use a source, and predicts the sources used by information users (Allen, 1977). Searching primary sources will probably indicate, put forward, or recommend additional sources or references.

Chaining followed the lead of the primary sources. Chaining can be done in a forward or backward manner. Backward chaining arises when indicators or citations from a primary source are monitored while forward chaining recognises and tracks other sources that point to a primary document or source (Choo, 1998). After the location of sources and materials, the next activity is browsing. Individuals habitually browse the web by viewing items such as contents tables, titles lists, subject headings, organisations or people's names, abstracts and summaries. Chang and Rice (1993:p. 258) regarded browsing as a "rich and fundamental human information behaviour that could lead to

outcomes such as modification of information needs, learning, serendipitous findings, and enjoyment."

Monitoring entails regular checking of some specific sources to follow the developments in a particular area. For example, scientists in the social sciences and physics disciplines tracked developments in their fields through core periodicals, newspapers, searching updates online, magazines, conferences, books, and catalogues (Ellis *et al.*, 1993). Differentiating involves user filtering and selecting digitised sources by observing the alterations between the nature and value of the information obtainable (Ellis, 1989). This process mainly depends on the previous experiences of the user with the sources, recommendations from lecturers or colleagues. Extracting is the action of methodically working through a specific source or sources to recognise resources of interest. Extracting may be accomplished by directly accessing the source, or by indirectly viewing bibliographies, online databases or indexes.

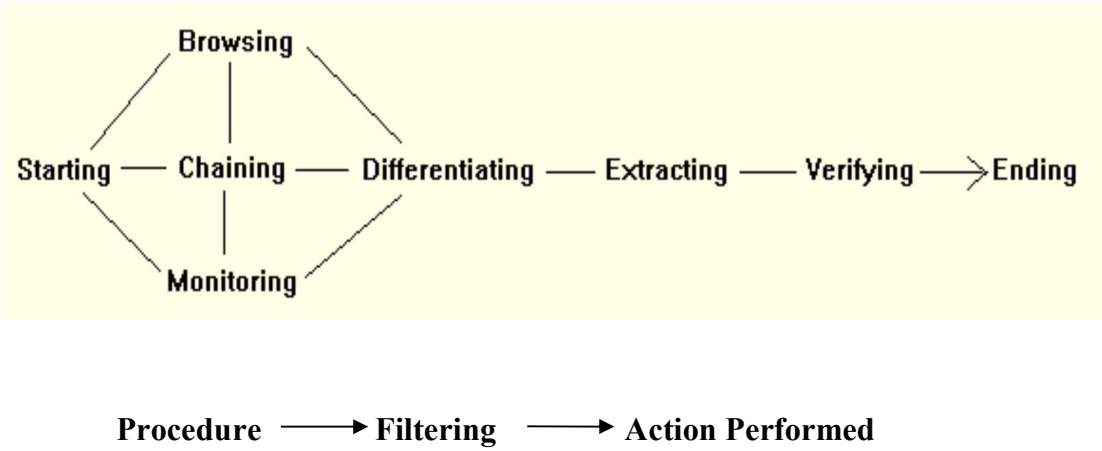

Figure: 2.1: A search process model based on Ellis' 'characteristics.'

(Source: Wilson, 1999:p. 255)

In summary, in a search process (See Fig 2.1), 'Starting' initiates a process while 'Ending' ends it. 'Chaining', 'Browsing' and 'Monitoring' are search procedures, whereas 'Differentiating' is a filtering process while 'Extracting' is an action executed on information sources. 'Verifying' entails examining the correctness of the information found while 'Ending' concludes the search. Although a user can navigate through the stages without following any chronological order, there is a postulation of the progression from 'starting' action of initiating a search, to 'ending' action of summarising what was found (Wilson, 1999). However, through 'extracting' process, a user may discover new citation from an established source and go to 'chaining' action which leads to more discovery of materials (Goh and Foo, 2008).

Based on these generic characteristics, Wilson (1999) observed that Ellis's model is separating the micro-analysis of search behaviour (starting, extracting, and chaining, verifying, ending) and an additional macro-analysis of information behaviour (browsing, differentiating, monitoring). Even though studies on academics and researchers are the basis of Ellis' model, the information-seeking behaviours categories could be applied to undergraduates. If the web is visualised as an information system that is hyperlinked and spread over various networks, it could be seen that almost all of the categories of Ellis' model of information seeking behaviour are already buoyed by the available in-built abilities of web browsers' software. (See Appendix I, Fig 2)

2.11.3 Tsai and Tsai Framework for analysing Online Information Searching Strategies

Tsai and Tsai (2003) projected a framework for analysing web-based search strategies of students to profile the search tactics employed by undergraduates while surfing for information on the internet. They observed and examined eight information search strategies of university undergraduates who took part in an online information searching task, a part of a computer course for beginners. The framework is similar to Hill (1999) conceptual framework for understanding searching of information in an open-ended information system which includes three domains: behavioural, procedural and metacognitive, as shown in Fig 2.2. Behavioural domain defined skills needed for essential Internet operation and navigation, which include two-aspect strategies, disorientation and control. The procedural domain is focused on general content search approaches on the Internet which also includes two-aspect strategies, problem-solving and trial and error. The metacognitive domain specified skills needed for higher-ordered

and content-related cognitive actions on the Internet which include three aspect strategies, select main ideas, purposeful thinking, and evaluation.

As a follow-up, Tsai (2009) further looked into the seven aspects strategies identified by the Tsai and Tsai (2003) framework. The control aspects of web search strategies include skills needed for the deployment of Internet search. Disorientation aspect is the consciousness by the learners of their search orientation. The trial and error aspects are skills involved in using diverse search methods. The problem-solving aspect includes capabilities and dedication needed in order not to get frustrated from the ensuing web-based search. The purposeful-thinking aspect includes self-monitoring skills needed for search processes. The select-main-ideas aspect includes capabilities needed to recognise significant ideas of the material sought from the web, while the evaluation aspect includes abilities to critic and organise the material obtained from the web.

The aspect strategies, which are seven, were categorised into three main domains of web search strategies. The association between the three-domain strategies and seven-aspect strategies is shown in Figure 2.2.

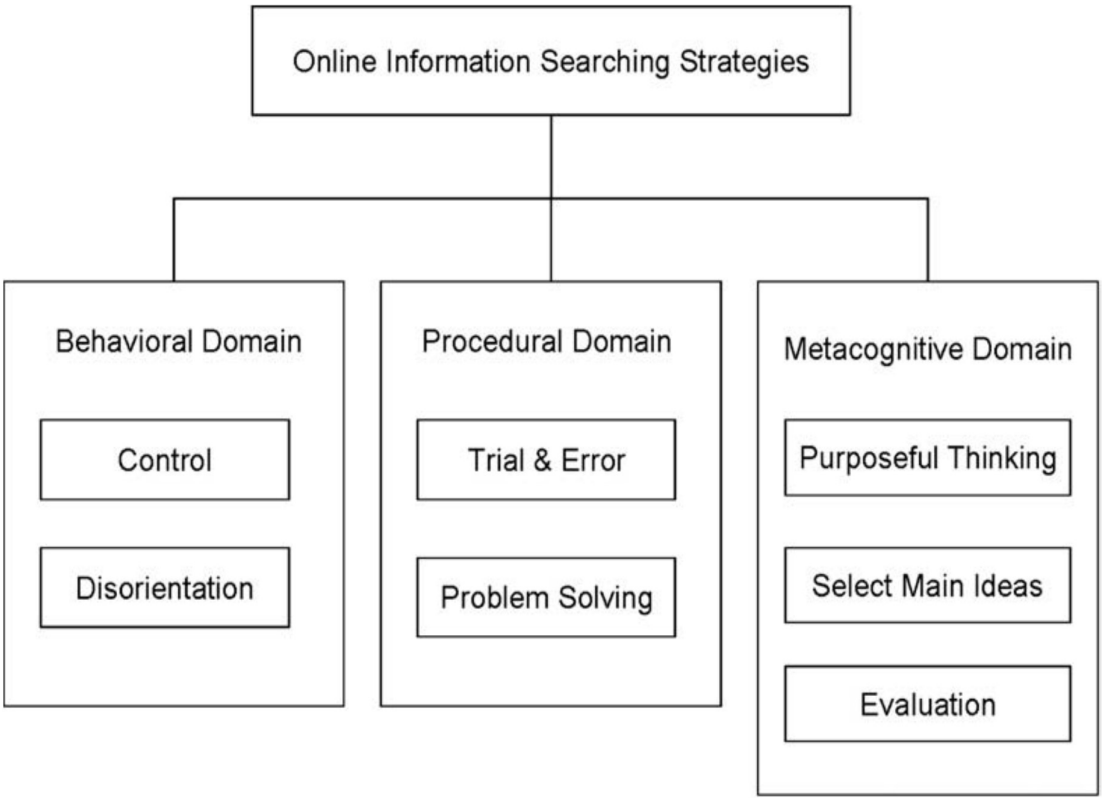

Figure: 2.2: Tsai and Tsai Framework for analysing Online Information Searching Strategies

(Source: Tsai, 2009:p. 474)

Tsai and Tsai (2003) opined that behavioural and procedural strategies might be improved by increased Internet experience; however, proper teaching and training is needed to improve metacognitive strategies (Weinstein and Mayer, 1986; Weinstein, 1994). Thus, Tsai and Tsai (2003) stressed the need for undergraduates to acquire better metacognitive strategies to enable them to retrieve relevant information and judge its usefulness. Tsai and Tsai (2003) framework established an essential theoretical foundation for the role played by search context in the web-searching behaviour of students. An instrument called the Online Information Searching Strategies Inventory (OISSI) was later developed by Tsai (220) based on the framework. The OISSI comprised of two versions - the short version for the evaluation of the three main domain strategies, that is, behavioural, procedural and metacognitive; and the full version for the evaluation of the seven aspects of the domain strategies.

The OISSI as a tool is used to appraise self-reflected web-searching strategies of undergraduates. The OISSI full version (See Appendix 1 Fig 3) consisted of 25 items with a reliability of 0.91. It is used for examining the web-searching behaviour of undergraduates in the seven aspects of the main domain strategies (disorientation, control, problem-solving, trial and error, select main ideas, purposeful thinking, and evaluation). A 6 point-Likert scale with ranges from “not at all like me” to “very much like me” was used in measuring the various items. The OISSI complete version has a total score of 25 to 150. A high score indicates a more sophisticated overall web-searching strategies for the undergraduate. Furthermore, higher sub-score in any of the aspect strategies represent more matured specific aspects of web search strategies. A high score for the disorientation aspect, however, indicates less disorientation and improved self-control over processes of online searching.

2.11.4 Media Richness Theory

Media richness theory describes and evaluates the effectiveness and richness of communication media in dealing with ambiguity in an organisation. It relates with media use and was developed by Richard L. Daft and Robert H. Lengel in 1984 and 1986 using information processing theory as the theoretical framework. Media richness theory explains communication challenges in two ways, uncertainty and equivocality. Uncertainty relates to lack of information which can be reduced by the amount of available information but in contrast, equivocality, that is, inability to properly interpret a task or an objective can only be reduced by the richness of the available information

and not the quantity (Daft, Lengel, and Trevino, 1987; Ishii, Lyons and Carr, 2019). Media richness was explained as the degree of the ability of a communication medium to increase the understanding of the user. Media that clarify ambiguity are termed to be richer while media that does not are termed to be less rich.

According to Dennis and Valacich (1999), all communication media have varying abilities in reducing uncertainty and equivocality to change understanding. Hence, richer media have the ability to reduce equivocality or misinterpretation of a message. The richness of communication media is measured based on the ability to establish personal focus, handle multiple cues, facilitate immediate feedback and utilize various languages (Daft and Lengel, 1984; Lengel and Daft, 1989). For example, a more equivocal message will require a medium with more cues and information to properly interpret, thus according to Lengel and Daft (1989), such media that allow more learning are termed richer media.

Library information resources range from prints to electronics and online sources. According to media richness theory therefore, the library information resource and format (medium) that is a rich- will be able to establish personal focus that induces interest to use the resources, make use of the available multiple cues (verbal and non-verbal), allow instant feedback and utilise natural language. Steuer (1995) opined that audio-visual media are richer than print media because of the rich interactive environment provided by the technology. Thus, the user's ability to use information is influenced by media with special features. Therefore, rich library information resources will reduce uncertainty and equivocality in the users and bring better understanding of the objective of using the resources.

Studies have shown that the use of library information resources is influenced by the perceived quality and richness of the information resources (Bahmani, 2014 cited in Farhadpoor, 2018). Skalski and Tamborini (2005) also suggested that ability to understand the message of an information resource will make the cues more pronounced and thereafter, induce a decision that will involve all the senses of the user resulting in making decisions that will have desired effects. Based on the media richness theory therefore, the perceived richness of library information resources is a factor that will influence the undergraduates to use the resources to aid their academic activities which will invariably enhanced their academic performance.

2.11.5 Uses and Gratifications Theory

Uses and gratifications theory (UGT) is embedded in communication studies and literature. As far back as the early 1940s, scholars have explored why people listen to quiz programme on radio or opera, why children read comic books (Lazarsfeld and Stanton, 1942, 1944, 1949; Her- zog, 1942; Wolfe and Fiske, 1949). UGT is a framework appropriate to understand the motive behind (why and how) using media or emerging technologies by individuals to satisfy specific needs. The theory seeks to understand the motive for and consequences of using new technology (Katz, Blumler and Gurevitch, 1973; Papacharissi and Rubin, 2010; Magsamen-Conrad, Dowd, Abuljadail, Alsulaiman, and Shareefi, 2015). UGT assumed that users are active consumers with a goal oriented use of media/technology, they have the initiative to integrate the choice technology that meet their needs, they desires to achieve gratification, and are responsible for their choices, as there are other information sources competing with their gratification (Katz, Blumler and Gurevitch, 1973; West and Turner, 2007).

Over the years, researchers have used the theory to explain interactions between human and media. For example, people preferring to interact with the Internet to avoid human interactions (Papacharissi and Rubin, 2010), increase in phone usage (Leung and Wei, 2000), and motivation for using tablets by adults and young people (Magsamen-Conrad et. al., 2015) among others. The approaches and constructs of UGT are still relevant in this present age despite the emerging technologies. Scholars have probed the uses and gratifications of many mobile technologies. For instance, Joo and Sang (2013) described reasons for undergraduate use of Smartphones, Wu, Kang and Yang (2015) identified reasons for purchasing paid applications (apps) and Bondad-Brown, Rice and Pearce (2012) observed that motivations for older technology extend to new ones. Studies have also shown that relieving of stress and relaxation are some of the gratifications users derived from using mobile apps (Ho and Syu, 2010; Wang, Matz-Costa, Miller, Carr and Kohlbacher, 2018).

Emerging technologies have increased the number of mobile devices and applications available for use, especially in the educational setting. Studies have tried to see how mobile technologies could foster academic performance (Yusup, 2014; Magsamen-Conrad et. al., 2015; Florenthal, 2018). UGT has helped to identify the motivations of undergraduates to use mobile technology for academic activities especially in terms of feedback (assessment). Mobile technology encourages interaction

between students, instructors and applications, thus, uses and gratifications concepts could be applied to examine the motivations for students to use mobile technologies and applications. Some of the key motivators for mobile technology use include social interaction, entertainment, engagement, self-expression, convenience, communication, learning and knowledge acquisition, credibility, information seeking and irritation among others (Choi, 2016; (Halaszovich and Nel, 2017; Florenthal, 2018).

Therefore, if instructors can leverage on these motivators, LIS undergraduates will be motivated to learn and acquire knowledge, express their opinion about what they are learning, engage and collaborate with others, access information on the web easily despite difficulties like non-free options, lack of connectivity or technological malfunctioning that may be encountered while they use mobile technologies for academic activities (Han, 2014; Voelkel and Bennett, 2014; Wong, 2016; Aleksic-Maslac, Sinkovic, and Vranesic, 2017; Florenthal, 2018).

2.11.5 Implications of the Theoretical Frameworks

According to Walberg educational productivity theory, if all these variables are adequately combined in the learning equation, the undergraduates will be academically successful, and their academic performance will be enhanced. Hence, the factors under consideration, web-searching behaviour, mobile technology, and library information resources use, belong to the supplementary or supportive group, which according to McGrew and Evans (2004) represents the psychological environment of students. For this reason, the appropriate combination of these variables in the learning equation with student characteristics and instruction could significantly influence the academic performance of LIS undergraduates.

Ellis' model of information seeking on the other hand indicated that, an undergraduate, while surfing the web for information that could aid learning could start the search from a few popular webpages or websites (starting) and track related information resources hypertext links either backward or forward directions (chaining). This could be followed by scanning the web pages of the selected sources (browsing), bookmarking valuable sources for further referencing and visits (differentiating), subscribing to alerts that will inform the undergraduate of new developments or information on topic of interest through e-mail services (monitoring) and searching a specific source or site for the entire information available on the site on a particular topic (extracting).

As a follow up to the Ellis' model of information seeking, Tsai and Tsai framework provided more information on how users perceived their ability in the use of the web, which is a reflection of the web-searching behaviour of the users. For instance, utilisation of the procedural domain skills (trial and error and problem-solving strategies) may help undergraduates and enable them in using metacognitive skills (purposeful thinking, selecting main ideas and evaluation strategies), which were found to enhance the academic performance of undergraduates. Hence, LIS instructors are to guide and train the students in the use of these strategies. Behavioural and procedural strategies improve with years of using the Internet, therefore, LIS undergraduates should be given assignments, term papers and projects that will encourage them to constantly use the web for these activities.

Media richness theory have situated the fact that rich library information resources and appropriate media will reduce uncertainty and equivocality in the library users. Availability, awareness and ubiquitous access to current information resources in various formats will influence the LIS undergraduates not only to visit the library, but to make effective use of the available resources which will invariably have a positive influence on their academic performance.

In conclusion, if LIS instructors are able to implement the Uses and gratifications concepts, the undergraduates will be motivated to use mobile technologies in learning, knowledge acquisition, searching and seeking for information on the web and accessing electronic library information resources among others. All these factors could positively influence their academic performance.

2.12 Conceptual model

In developing a conceptual model for this study, an attempt was made to explore some predictors of the academic performance of undergraduates. Fig 2.3 exhibits the conceptual model, which encompasses the linkages between web-searching behaviour, mobile technology, library information resources and academic performance of LIS undergraduates. The independent variables were constructed based on Walberg Educational Productivity theory (Walberg, 1981) as these variables belong to the supplementary or supportive group, that is, the socio-psychological environment of an undergraduate that could influence the academic performance. Mobile technology use was constructed based on constructivism theory while Ellis' model of information

seeking and Tsai and Tsai framework was used to develop web-searching behaviour constructs.

Conceptual Model of Relationship between Web-searching Behaviour, Mobile Technology Library Information Resources Use and Academic Performance

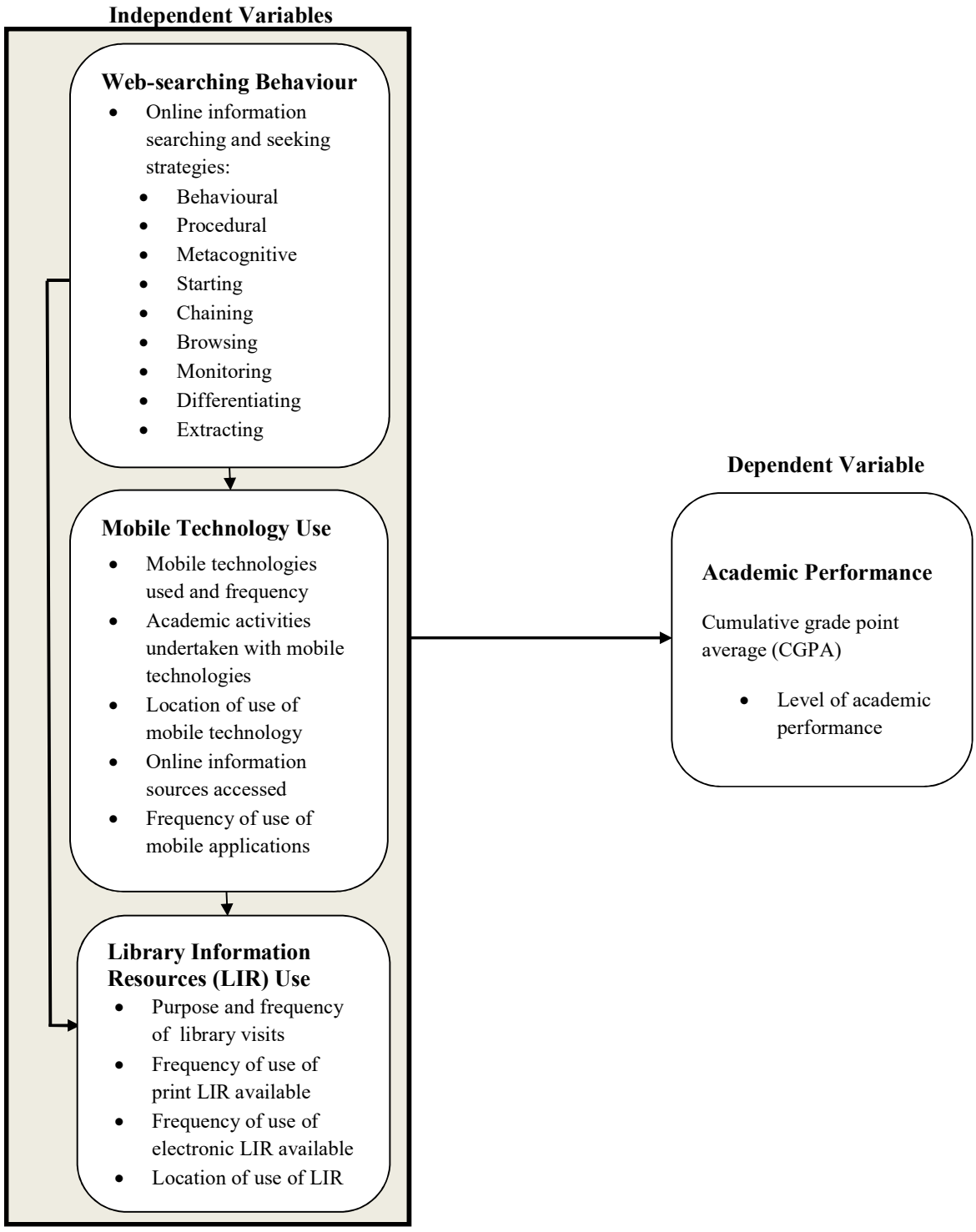

Figure: 2.3: Relationship between web-searching behaviour, mobile technology use, library resources use and academic performance.

Figure 2.3 presents a conceptual model of the study constructed by the researcher, which was adapted from Kumar (2014). The model indicates that the dependent variable, that is, academic performance, is associated with the independent variables investigated in the study, which are web-searching behaviour, mobile technology, and library information resources use. The conceptual model proposes an association between the independent and the dependent variable. The dependent variable is the academic performance, conceptualised in terms of CGPA involving continuous assessment and examination.

Web-searching behaviour, which will be investigated in terms of online information seeking for academic purposes - starting, browsing, chaining, monitoring, differentiating and extracting; and information search strategies for academic purposes - disorientation, control, problem-solving, trial and error, select main ideas, purposeful thinking and evaluation; is connected to academic performance. The model proposes that if web-searching is conducted effectively and efficiently, it will result in high academic performance or otherwise low if web-searching is not conducted correctly. This view is in tandem with findings of earlier research conducted by (Cmor and Lippold, 2001; Malik and Mahmood, 2009; Bhattacharjee, 2014) which revealed that effective use of web facilities enhances the academic performance of students because it provides access to current information.

Mobile technology use, which was conceptualised as academic activities performed using mobile technology, the location of use of mobile technology, online information sources access using mobile technology, applications used on mobile technology for academic purposes and, attitudes and preferences towards using mobile technologies is also linked to academic performance. The academic performance of undergraduates may be influenced positively if mobile technology is used correctly by undergraduates, and if not, their academic performance could be affected negatively. This assertion is supported by researchers like (West, 2013; UTEP, 2013: Murphy *et al.*, 2014; West, 2015) who argued that undergraduates engaged more in learning with mobile technology because they are used to interacting with it.

Lastly, library information resources use was conceptualised in terms of location of use of library information resources, the frequency of use of library information resources by library visits and online, and linked to academic performance. It is assumed that the more the undergraduates effectively utilise library information resources, services, and facilities, the better they perform academically. This assumption agrees

with studies that have shown that use of library could predict the academic performance of students uniquely (De Jager, 2002; Laird and Kuh, 2005; Wong and Webb, 2011; Soria *et al.*, 2013).

2.13 Appraisal of the literature review

Academic performance was generally agreed on by all the literature reviewed to play a critical role in producing par excellent graduates who are to grow into a high-quality human resource required for national, economic and social development. However, it was observed from all the literature reviewed that emphasis was placed on the fact that academic performance is a challenging aspect of the academic research, which must be accorded the appropriate attention. Moreover, the literature search revealed a paucity of published literature on studies on the academic performance of LIS undergraduates in universities in Nigeria. Therefore, undergraduates' academic performance measurement in higher citadel of learning in Nigeria should be given considerable attention in research. Hence, this study set out to fill this gap.

The literature revealed that LIS undergraduates' education is in a dynamic information world and so the focus of training is for them to gain relevant skills on emerging technologies to become a part of the profession that continually responds to emerging challenges of the information age. Most of the studies also revealed that LIS undergraduates are expected to have the ability to assimilate concepts, engage in learning and undergo comprehensive educational programmes with excellent academic performance to secure a lucrative job. Thus, they will need to conduct web-searching efficiently and effectively, use mobile technology properly and make use of the information resources available through their university, faculty or departmental libraries. Thus, studying factors that could enhance their academic performance could also ensure a smooth transition into the librarianship profession.

It was identified from the literature reviewed that studies conducted on the web-searching behaviour of undergraduates did not directly relate to academic performance. Most of these studies, for example, Ebersole (2005), Kinley (2013) and Bhattacharjee (2014), did not analyse web-searching behaviour directly but instead tried to identify the percentage of those who searched the web, the tasks performed, how they perceived web search tools and carried out searches. However, the studies mentioned several factors associated with search behaviour. Thus, up to the present time, limited studies were published on how web-searching behaviour of undergraduate influence their academic

performance. Therefore, this is an identified gap in the literature that this study intends to fill.

In the same way, mobile technology use has been noted to influence the performance of students positively and recommended as support for academic learning for undergraduates in recent studies (Dahlstrom *et al.* 2012; UTEP, 2013; Coffin and Lyle, 2015; Kibona and Mgaya, 2015). The use of mobile technology was reported to facilitate students' interactions, teamwork, sharing and learning in an academic settings with their peers, friends, and family and is not restricted by location or time. Considering the benefits of mobile technology, therefore, it would be ideal for investigating its usefulness in the Nigerian educational setting and its influence on the academic performance of undergraduates in LIS schools in Nigerian Universities.

It has also been reported in the literature reviewed that libraries information resources, primarily e-resources, can contribute maximally to the education of today's undergraduates (ACRL, 2010; Goodall and Pattern, 2011; Wong and Webb, 2011; Soria *et al.* 2013; Jato, Ogunniyi and Olubiyo, 2014; Brown and Malenfant, 2015; ACRL, 2017). These studies had shown that using library information resources could predict academic outcome of undergraduates uniquely. Consequently, it is essential to examine the influence of library information resources use by LIS undergraduates on their academic performance, especially as libraries are embracing new technological advances that make the library resources, services and facilities visible and easily accessible even when undergraduates are not physically present in the library. However, none of the published literature studied related to the level to which web-searching behaviour, mobile technology, and library information resources use predicts the academic performance of LIS undergraduates in Nigerian universities. Also, studies have not researched the web search behaviour of students directly with academic performance. This study intends to fill these identified gaps.

CHAPTER THREE
METHODOLOGY

This chapter explains the research design, the measures employed for the study, administration of questionnaire, response rate and the CGPA data from the LIS departments under the following sub-headings:

3.1 Research design
3.2 Population of the study
3.3 Sampling technique and sample size
3.4 Research instruments
3.5 Validity and reliability of research instruments
3.6 Data collection procedure
3.7 Method of data analysis
3.8 Questionnaire administration, response rate and data on CGPA from the LIS departments

3.1 Research design

The descriptive research design was adopted for this study. Specifically, the *ex-post facto* design of the correlational type was employed. This research design allowed the researcher to determine the relationships amongst the variables of the study without any manipulations (Kumar, 2014). Thus, by the use of this research design, the researcher identified and established the relationship between web-searching behaviour, mobile technology, library information resources use and academic performance of the undergraduates.

3.2 Population of the study

The population of this study include undergraduates in the 23 Nigerian universities accredited by National University Commission (NUC) to offer a bachelor of library and information science (BLIS) programmes. The Librarians' Registration Council of Nigeria, the body that regulates LIS profession in Nigeria generated the list

of the accredited universities for LIS programmes (LRCN, 2016) (See Table 3.1). There are other universities offering library-related courses accepted by the Joint Admission Matriculation Board (JAMB) but which are not accredited by the NUC. These universities were, therefore, excluded from this study. The study population consists of all the full-time 200, 300 and 400 level LIS undergraduates (See Table 3.2) in the approved LIS schools in Nigerian universities. The 100 level LIS undergraduates were excluded because they were yet to have CGPA calculated for the courses they offered in the first year in their various institutions. Furthermore, the LIS schools were found in the three groups of universities in Nigeria, that is, federal, state, and private-owned universities. These universities are located in the six geopolitical zones of Nigeria. The total population of undergraduates in the LIS schools in the 200 - 400 levels was seven thousand, one hundred and fifteen (7115). (See Table 3.1)

Table 3.1. List of approved/accredited universities in Nigeria offering Library and Information Science programmes

S/N	Universities	University Ownership	Geopolitical Zones	Year of Establishment	Undergraduates Population
1	Abubakar Tafawa Balewa University, Bauchi	Federal	NE	1988	234
2	Ahmadu Bello University, Zaria	Federal	NW	1962	915
3	Bayero University, Kano	Federal	NW	1975	689
4	Federal University of Technology, Minna	Federal	NC	1982	198
5	Federal University of Technology, Yola	Federal	NE	1981	176
6	Nnamdi Azikiwe University, Akwa	Federal	SE	1992	142
7	University of Calabar	Federal	SS	1975	220
8	University of Ibadan	Federal	SW	1948	150
9	University of Ilorin	Federal	NC	1975	152
10	University of Maiduguri	Federal	NE	1975	430
11	University of Nigeria, Nsukka	Federal	SE	1960	129
12	University of Uyo, Akwa Ibom	Federal	SS	1991	149
13	Abia State University, Uturu	State	SE	1981	242
14	Ambrose Ali University, Ekpoma	State	SS	1980	466
15	Benue State University, Makurdi	State	NC	1992	790
16	Delta State University, Abraka	State	SS	1992	485
17	Imo State University, Owerri	State	SE	1992	455
18	Kwara State University, Malete	State	NC	2009	165
19	Tai Solarin University of Education, Ijebu-Ode	State	SW	2005	353
20	Umaru Musa Ya'adua University, Katsina	State	NW	2006	461
21	Adeleke University, Ede	Private	SW	2011	67
22	Benson Idahosa University, Benin City	Private	SS	2002	13
23	Madonna University, Okija	Private	SE	1999	34
				Total	7115

Source: *Librarians' Registration Council of Nigeria (LRCN), 2016 and Academic Planning Establishments of the universities, 2016*

(NB: NC – North-central, NE – North-east, NW – North-west, SE – South-east, SS – South-south, SW – South-west)

Table 3.2. Distribution of LIS Undergraduates by the Year of study

S/N	Universities	200L	300L	400L	Total
1	Abubakar Tafawa Balewa University, Bauchi	62	54	118	234
2	Ahmadu Bello University, Zaria	420	218	277	915
3	Bayero University, Kano	244	225	220	689
4	Federal University of Technology, Minna	80	80	38	198
5	Federal University of Technology, Yola	77	57	42	176
6	Nnamdi Azikiwe University, Akwa	35	63	44	142
7	University of Calabar	92	65	63	220
8	University of Ibadan	47	41	62	150
9	University of Ilorin	69	26	57	152
10	University of Maiduguri	167	121	142	430
11	University of Nigeria, Nsukka	47	41	41	129
12	University of Uyo	58	51	40	149
13	Abia State University, Uturu	82	46	114	242
14	Ambrose Ali University, Ekpoma	126	185	155	466
15	Benue State University, Makurdi	185	285	320	790
16	Delta State University, Abraka	143	144	198	485
17	Imo State University, Owerri	177	121	157	455
18	Kwara State University, Malete	68	32	65	165
19	Tai Solarin University of Education, Ijebu-Ode	155	140	58	353
20	Umaru Musa Ya'adua University, Katsina	147	133	181	461
21	Adeleke University, Ede	11	24	32	67
22	Benson Idahosa University, Benin City	5	3	5	13
23	Madonna University, Okija	10	14	10	34
	Total	2507	2169	2439	7115

Source: *Academic Planning Establishments of the universities, 2016*

3.3 Sampling technique and sample size

Multi-stage sampling procedure was employed for this study. This technique required the researcher to identify all the members of the population, define and stratify the population more narrowly (Cadima, Caramelo, Afonso-Dias, Tandstad, and De Leiva-Moreno, 2005; Adams and Lawrence, 2015). Therefore, in stage one (1) of the sampling techniques, all the six geopolitical zones in Nigeria were completely enumerated and represented in the study. Thus, the universities in each of the zones were stratified into three groups: federal, state and private-owned universities. The stratification was done based on the ownership of the universities within the six geopolitical zones in Nigeria (see Table 3.3). In stage two (2), universities were selected randomly through balloting from all the geopolitical zones. This selection was carried out for both federal and state. However, one zone had no state university. It was also discovered that there were only three (3) private universities with library schools in all the zones. Therefore, all private universities were included. Thus, a total of 14, that is, 61.0% of the 23 universities were randomly selected (See Table 3.4). This is in tandem with the opinion of Hammed and Popoola (2006) who suggested that the chosen sampling fraction for a study should be at least sixty per cent (60.0%) to ensure that a reasonable size of the population is included in the sample selection.

In stage three (3), full-time LIS undergraduates in 200, 300 and 400 levels were purposively chosen for this study. This selection was made because these groups of LIS undergraduates were expected to be available on campus throughout their study, and their CGPA would be readily available. Direct-entry and 100 level LIS undergraduates were not included in the study population because they had no CGPA for the previous session. Thus, in stage four (4), a sample of the LIS undergraduates for the study was randomly selected within the primary sampling units, that is, the purposively selected LIS undergraduates in the selected universities in stage 1 using proportionate stratified sampling technique. According to Adams and Lawrence (2015), the total number of the sample from each stratum is to be chosen according to its proportion in the total population. Besides, Akuezuilo and Agu (2003) had earlier opined that it is better to study only a portion of the population when the study population is large, and the study has a limited time. Thus, 40.0% of the LIS undergraduates in each stratum were selected proportional to the size of each stratum in the population. Therefore, the total number of LIS undergraduates studied was (1526).

Table 3.3. Stratification of university ownership by geopolitical zones

Ownership/ Geopolitical Zones	North Central	North East	North West	South East	South-South	South West	Total	Number of universities selected
Federal	2	3	2	2	2	1	12	**6**
State	2	-	1	2	2	1	8	**5**
Private	-	-	-	1	1	1	3	**3**
Total	4	3	3	5	5	3	23	**14**

Proportional to size stratified sampling technique allowed the use of smaller sample for greater precision and also to ensure that the reasonable size of the undergraduates is included in the sampling selection (Akuezuilo and Agu, 2003). Consequently, the sample size for this study was determined by multiplying a sample fraction of forty per cent (40%) with the known population of LIS undergraduates in each stratum.

Thus,

$$n = f*N$$

Where,

n = Sample size
f = Sampling fraction (40.0%)
N = Population of the LIS undergraduates by level

The total sample size for the study is one thousand, five hundred and twenty-six (1526). The estimated sample size is presented in Table 3.4.

Lastly in stage five (5), the copies of the questionnaire were administered to LIS undergraduates that were available and willing in each of the 14 universities. This was done based on the selected proportion allocated by levels of the LIS undergraduates in each university in the study population (See Table 3.4).

Table 3.4. Distribution of the study sample

S/N	Universities	University Ownership	Population				Sample			
			200L	300L	400L	Total	200L	300L	400L	Total
1	Abubakar Tafawa Balewa University, Bauchi	Federal	62	54	118	234	**25**	**22**	**47**	**94**
2	Ahmadu Bello University, Zaria	Federal	420	218	277	915	**168**	**87**	**111**	**366**
3	University of Calabar	Federal	92	65	63	220	**37**	**26**	**25**	**88**
4	University of Ibadan	Federal	47	41	62	150	**19**	**16**	**25**	**60**
5	University of Ilorin	Federal	69	26	57	152	**28**	**10**	**23**	**61**
6	University of Nigeria, Nsukka	Federal	47	41	41	129	**19**	**16**	**16**	**51**
7	Ambrose Ali University, Ekpoma	State	126	185	155	466	**50**	**74**	**62**	**186**
8	Imo State University, Owerri	State	177	121	157	455	**71**	**48**	**63**	**182**
9	Kwara State University, Malete	State	68	32	65	165	**27**	**13**	**26**	**66**
10	Tai Solarin University of Education, Ijebu-Ode	State	155	140	58	353	**62**	**56**	**23**	**141**
11	Umaru Musa Ya'adua University, Katsina	State	147	133	181	461	**59**	**53**	**72**	**184**
12	Adeleke University, Ede	Private	11	24	32	67	**4**	**10**	**13**	**27**
13	Benson Idahosa University, Benin City	Private	5	3	5	13	**2**	**1**	**2**	**5**
14	Madonna University, Okija	Private	10	14	10	34	**4**	**6**	**5**	**15**
Total			1436	1097	1281	3814	**574**	**439**	**512**	**1526**

3.4 Research instruments

The research instruments that were used for this study were questionnaire and university academic records. Data collection using a questionnaire is quite popular, particularly in descriptive surveys (Kothari, 2004). Thus, primary and secondary data were collected for this study.

3.4.1 The questionnaire

The questionnaire used for this study consisted of four sections with close and open-ended questions. Section A was self-developed by the researcher; Section B was adopted from Tsai (2009) and Choo, Detlor and Turnbull (1999); Section C was adapted from Murphy, Faley, Lane, Hafeez-Baig and Carter (2014); while sections D and E were adapted from Shrestha (2008). Primary data was collected from the undergraduates using the questionnaire. The five sections were:

Section A tagged "Socio-Demographic Profile and Background Information of LIS Undergraduates Scale" consisted of fourteen (14) questions which were used to measure the demographic profile and information on technology adoption, length, frequency and location of web search, search engines and web browsers used, ownership of mobile technology, frequency and purpose of library visits.

Section B, which was tagged "Web-searching Behaviour of LIS Undergraduates Scale" consisted of two questions (15) with 31 items measuring the web-searching behaviour of the students in terms of online information seeking and searching strategies (OISSI by Tsai, 2009 and Ellis Model);

Section C tagged "Mobile Technology Use of LIS Undergraduates Scale" consisted of seven questions (16-22) with 59 items measuring academic activities undertaken with mobile technologies, location of use, online information sources access using mobile technology, application used on mobile technology for academic purposes, attitudes towards use and preferences for use; and,

Section D tagged "Use of Library Information Resources (Print) by LIS Undergraduates Scale" consisted of one question (23) with eleven (11) items measuring the frequency of use of library information resources in print format.

Section E tagged "Use of Library Information Resources (Electronic) by LIS Undergraduates Scale" consisted of two questions (24-25) with 33 items measuring the frequency of use of library information resources in electronic format and location of use.

3.4.2 University academic records

The secondary data that was collected for this study were university records bearing the CGPAs' of the undergraduates. The CGPA of the previous session of the selected undergraduates was used for the study. This was collected from the offices of the Head of Department and correlated with the findings from the primary data.

3.5 Validity and reliability of the research instruments

When developing a new research instrument such as a questionnaire, it is vital to demonstrate face validity (Gray, 2014). Thus, the research instrument was presented to the supervisor and experts in the Department of Library, Archival and Information Studies (LARIS), Faculty of Education, the University of Ibadan to ascertain the face validity, resulting in useful criticism, corrections and additions which were duly effected. Furthermore, to ensure the validity of the data collection instruments, it was subjected to content validity test using pre-test method. Thirty (30) copies of the questionnaire were administered to 200, 300 and 400 levels undergraduates in the Department of Library and Information Resources Management, Babcock University, Ilishan-Remo, Ogun State.

The reliability of the research instrument was determined by the degree of accuracy and consistency when the instrument was administered. Based on DeVellis (2003) recommendation, there should be a high inter-correlation among items in a scale. Thus, if correlations among items are high, the reliabilities of the individual item will be high which will increase the reliability of the scale. The reliability coefficient, Cronbach's Alpha, is an essential indicator of the quality of a scale. If Cronbach's Alpha is closer to 1.0, the internal consistency of each item on the scale will be high.

Therefore, the internal reliability of the research instrument measured by Cronbach's alpha analysis was as follows: Section B: Web-searching Behaviour Scale (information searching strategies (Online Information Searching Strategies Inventory (OISSI)) and information seeking activities (Ellis' Model)) 0.92; Section: C: Mobile Technology Use Scale (academic activities undertaken with mobile technologies, attitudes towards use, preferences for use and location of use mobile technology) 0.77; Section D and E: Library Information Resources Use Scale (measuring frequency of use of library information resources and location of use) 0.96. The overall reliability of the instrument is 0.91, which shows strong relationships between the items making the instrument highly reliable for data collection for the study.

3.6 Data collection procedure

The research instrument was administered collectively to all the LIS undergraduates in the fourteen (14) universities in their lecture rooms. This ensured a high response rate. Also, having personal contact with the study population provided an opportunity to explain the purpose of the study and clarified any question that the respondents had. Three research assistants were engaged and trained in data collection, along with the researcher. Before the exercise, however, permission was obtained from the Heads of the Department in the various library schools for the questionnaire to be administered. A covering letter introducing the researcher and describing the purpose of the survey soliciting the cooperation of the undergraduates in promptly filling and returning the questionnaire was attached to the questionnaire. The undergraduates were assured of the confidentiality of their responses.

Thus, the administration of the questionnaire (See Appendix V) took place in-between lecture hours in each of the universities. A day to visit each university was scheduled with the help of the departmental offices. The copies of the questionnaire were administered and retrieved immediately from the respondents that were available and willing.

Moreover, the introduction letters (See Appendix IV) addressed to each of the 14 LIS Departmental Heads, by the Head of LARIS Department, which explicitly stated the collection of the CGPA of LIS undergraduates for 2016/2017 session, was presented to the Head of the LIS Department in each of the universities. Collection of the CGPA of the respondents took a long time because of the sensitive nature of the academic record. Consequently, the influence of the supervisor, senior experts and colleagues was leverage on in contacting each of the Heads, who then assigned a lecturer to assist with the academic record bearing the CGPA of the respondents. The matriculation numbers of the respondents were collated and presented to the departmental offices/ Academic Affairs Establishment of each of the universities. This was used by each of the LIS Departments to generate the CGPA of the respondents for the 2016/2017 session. Some of the respondents filled in wrong matriculation number which made their copies of the questionnaire unusable because they could not be validated.

3.7 Method of data analysis

The secondary data collected for this study, that is, the university records bearing the CGPAs of the undergraduates from the offices of the Head of Departments were

grouped into High, Medium and Low. 1st Class and 2nd Class Upper grades fell within the High group, 2nd Class Lower-grade fell into the Medium group while 3rd Class and Pass grades formed the Low group.

After that, both the primary and secondary data collected in respect of the research questions for this study were summarised and analysed using descriptive statistics like percentages, frequencies, pie chart, columns, mean and standard deviation. The null hypotheses were tested using inferential statistics. Specifically, the Pearson's Product Movement Correlation Coefficient Analysis was used to test null hypotheses 1 to 6, while Multiple Regression Analysis was used to test null hypotheses 7 and 8. The Statistical Package for Social Sciences (SPSS 22) was used in analysing the data.

3.8 Questionnaire administration, response rate and data on CGPA from the LIS departments

The breakdown of the total respondents, response rate and data on CGPA of LIS undergraduates from each of the LIS Departments, which were used for this study, is indicated by universities, ownership and levels of the LIS undergraduates in Tables 3.5 and 3.6

Table 3.5. Questionnaire Administration and Response Rate of Respondents

Ownership	S/N	University	Acronym	No of questionnaire administered	No of questionnaire returned	No of the usable questionnaire	Response rate (%)	Overall (%)
Federal	1	Abubakar Tafawa Balewa University, Bauchi	ATBU	94	73	70	74.5	5.6
	2	Ahmadu Bello University, Zaria	ABU	366	354	331	90.4	26.5
	3	University of Calabar	UNICAL	88	79	79	89.8	6.3
	4	University of Ibadan	UI	60	57	57	95.0	4.6
	5	University of Ilorin	UNILORIN	61	58	38	62.3	3.0
	6	University of Nigeria, Nsukka	UNN	51	50	46	90.2	3.7
State	7	Ambrose Ali University, Ekpoma	AAU	186	161	156	83.9	12.5
	8	Imo State University, Owerri	IMSU	182	179	134	73.6	10.7
	9	Kwara State University, Malete	KWASU	66	49	47	71.2	3.8
	10	Tai Solarin University of Education, Ijebu-Ode	TASUED	141	135	118	83.7	9.4
	11	Umaru Musa Ya'adua University, Katsina	UMYU	184	159	134	72.8	10.7
Private	12	Adeleke University, Ede	AUE	27	19	19	70.3	1.5
	13	Benson Idahosa University, Benin City	BIU	5	5	5	100.0	0.4
	14	Madonna University, Okija	MUA	15	15	15	100.0	1.2
		Total		**1526**	**1393**	**1249**	**81.8**	**100.0**

A total of 14 universities comprising six (6) Federal universities, five (5) state universities and three (3) private universities offering LIS programme were selected from the six geopolitical zones in Nigeria. The sample size for the study consisted of 1,526 LIS undergraduates from the selected universities. Out of the 1,526 copies of the questionnaire administered, the copies returned were 1,393, and the copies found usable and valid for analysis were 1,249 (81.8%).

It could be seen from Table 3.5a that the majority of the study respondents were from Ahmadu Bello University, Zaria (26.5%), followed by Ambrose Ali University, Ekpoma (12.4%), Imo State University, Owerri (10.7%) and Umaru Musa Ya'adua University, Katsina (10.7%) respectively. Benson Idahosa University, Benin City and Madonna University, Anambra which had the least number of respondents, 0.4% and 1.2% respectively had the highest return rate of 100% while the University of Ilorin had the least return rate of 62.3%. The shortfall in the response rate from the University of Ilorin compared with the other universities was because the department did not release the university record bearing the CGPA of the respondents. Thus the researcher had to use only the self-reported CGPA by the respondents and unfortunately, not all the respondents filled-in their CGPAs.

Overall, a return rate of 81.8% was achieved for the study, which is much higher than the acceptable standard of 60.0% for research (Fincham, 2008). The letters of introduction (See Appendix IV) issued by the Head of Department, Library, Archival and Information Science (LARIS), which explicitly stated the need for the CGPA of LIS undergraduates from the departments to validate the self-reported CGPA aided the high response rate. The data on CGPA is presented in Table 3.6.

Table 3.6. Breakdown of the Data on CGPA from the LIS Departments

	200L		**300L**		**400L**		**Total**	
CGPA	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1st Class Grade	9	0.7	8	0.6	11	0.9	**28**	**2.2**
2nd Class Upper Grade	177	14.2	113	9.0	154	12.3	**444**	**35.5**
2nd Class Lower Grade	229	18.3	152	12.2	203	16.3	**584**	**46.8**
3rd Class Grade	56	4.5	68	5.4	44	3.5	**176**	**14.1**
Pass Grade	7	0.6	6	0.5	12	1.0	**25**	**2.0**
Total	**478**	**38.3**	**347**	**27.8**	**424**	**33.9**	**1249**	**100.0**

3.9 Ethical considerations for the study

I solemnly state that this study was carried out by me. All the sources of works by authors, editors and corporate bodies used in carrying out this study were duly referenced. The respondents consented to provide the needed information for this study of their own will and were not in any way coerced or induced to participate in the study. The ethical consideration that guided the researcher in the course of this study are discussed under the following headings:

a. **Informed consent:** The respondents were duly informed of the objectives of the study and their assistance was solicited. Letters from LARIS department, signed by the Head of Department were directed to the library school heads for the release of the respondents' CGPA (See Appendix IV). All the letters were favourably attended to.
b. **Confidentiality:** The respondents were assured of the confidentiality of their responses which were to be used for educational purposes only. These were clearly stated in the introductory letter on the questionnaire (See Appendix III).
c. **Plagiarism:** This work was subjected to Turnitin Antiplagiarism software to ascertain the originality of the content. As stated by the university, the similarity check must not be above 23%. The duly cited references are all according to the University of Ibadan Manual 0f Style for Referencing.
d. **Falsification and fabrication of data:** The thesis does not contain any falsified data in any form. The data analysed and presented were the primary data collected from the departmental offices and the responses of the participants. The researcher ensured that there was no fabrication of data during the collection, analysis and presentation.
e. **Risk concern:** Questionnaire was used for data collection from LIS undergraduates across the six geo-political zones in Nigeria. Responses were sorted on issues relating to demographics characteristics, academic performance, web-searching behaviour, mobile technology and library information resources use of the LIS undergraduates. The instrument does not include any ethnicity or religious bias that could pose a risk. At such, this work is free of any risk concern.
f. **Beneficence:** It is believed that the result of this study will be of huge benefit to LIS undergraduates and other undergraduates, LIS educators, library schools, policymakers, curriculum developers, university authorities, academic libraries, librarians, researchers, academics and web/mobile platforms developers. The

outcome of this study could expand the knowledge base on web searching behaviour and how LIS undergraduates in Nigeria utilise mobile technologies and the available information resources in the libraries to support their academic activities.

CHAPTER FOUR
RESULTS AND DISCUSSION

This chapter presents the results of the data analysis, interpretation, and discussion of the findings of the study. Data analysed based on the research questions and hypotheses in respect of factors predicting the academic performance of library and information science (LIS) undergraduates in Nigerian universities were presented and discussed. The discussion was done under the following sub-headings:

4.1 Socio-demographic characteristics of respondents

4.2 Answers to research questions

4.3 Test of the Hypotheses

4.4 Discussion of the findings

4.1 Socio-demographic profile of respondents

The socio-demographic profile of LIS undergraduates in Nigerian universities is as presented in Table 4.1. The profile is based on the year of study, gender and age range of the LIS undergraduates.

Descriptive statistics (pie chart, columns, frequency counts and percentages) was used for the analyses of the collected data. The data showed that out of 1249 respondents, 477 (38.2%) were at 200 level, 347 (27.8%) in 300 level while 425 (34.0%) were at 400 level. The result also indicated that majority of the LIS undergraduates were within the age bracket of 18 years to 24 years (22-24 years - 40.5% and 18-21 years-31.4%) while only 1.6% of the respondents were below 18 years.

The gender distribution of the undergraduates is also as shown in Table 4.1. The gender distribution of male and female respondents were almost equal, although the female respondents who were 659 out of the 1249 respondents were 5.6% more than the males. This distribution indicated that both genders are almost equally represented in the study.

Table 4.1. Socio-demographic Profile of Respondents

Socio-Demographic Profile	Categories	Frequency (N) (n=1249)	Percentage (%)
	200	477	38.2
	300	347	27.8
Year of Study	400	425	34.0
	Total	**1249**	**100**
	Below 18	20	1.6
	18-21 years	392	31.4
	22-24 years	506	40.5
Age Range	25 and above	331	26.5
	Total	**1249**	**100.0**
	Male	590	47.2
Gender	Female	659	52.8
	Total	**1249**	**100.0**

4.2 Answers to research questions

The answers to the research questions that guided this study are presented in this section.

4.2.1 Research question 1: What is the level of the academic performance of LIS undergraduates in Nigeria based on their Cumulative Grade Point Average (CGPA)?

To determine the level of the academic performance of LIS undergraduates in Nigeria, respondents were asked to state their CGPA for the previous session, that is, 2016/2017 session. The university record, bearing the CGPA of the LIS undergraduates for the same session was also collected from each of the universities. The CGPA was sub-divided into three categories, namely, High, Medium and Low, based on the 5-Point grading scale approved by the National University Commission (NUC) which is used in Nigerian universities. These are the 1st class (4.5 – 5.0) and 2nd class upper (3.5 – 4.49) – High; 2nd class lower (2.5 – 3.49) – Medium; and 3rd class (1.5 – 2.49) and Pass (1.00 – 1.49) – Low. For UI and KWASU, however, who used the 7-Point grading scale and 4-Point, respectively, the grade points were aligned with that of other universities. The self-reported CGPAs of the undergraduates were then validated using the university record. The level of the academic performance of the respondents based on their CGPA is presented in Figures 4.1 and 4.2.

The data in Figure 4.1 showed that the level of the academic performance of close to half of the respondents (46.8%) fell within the medium category, 37.7% were within the high category while 16.1% of the respondents were within the low category. It is therefore evident from the result that the level of the academic performance of the majority of the respondents is medium. Besides, the analyses of the CGPA based on the year of study of the respondents as shown in Figure 4.2 revealed that, out of the 46.8% of the respondents that were within the medium category, 18.3% were in 200L, 16.3% were in 400L while 12.2% were 300L undergraduates. For those that fell within the high category, respondents in 200L had the highest percentage (14.9%), followed by those in 400L (13.2%) and the least were those in 300L (9.6%).

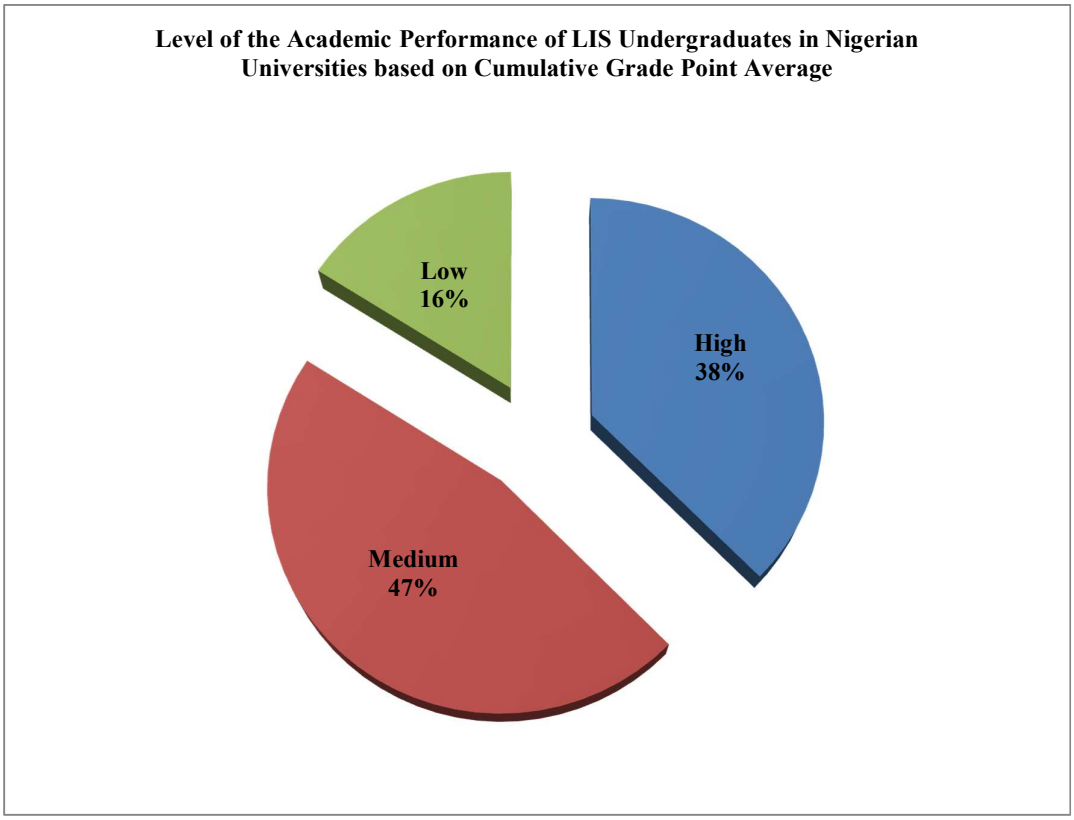

Figure: 4.1: Level of the academic performance of LIS undergraduates in Nigerian universities based on cumulative grade point average

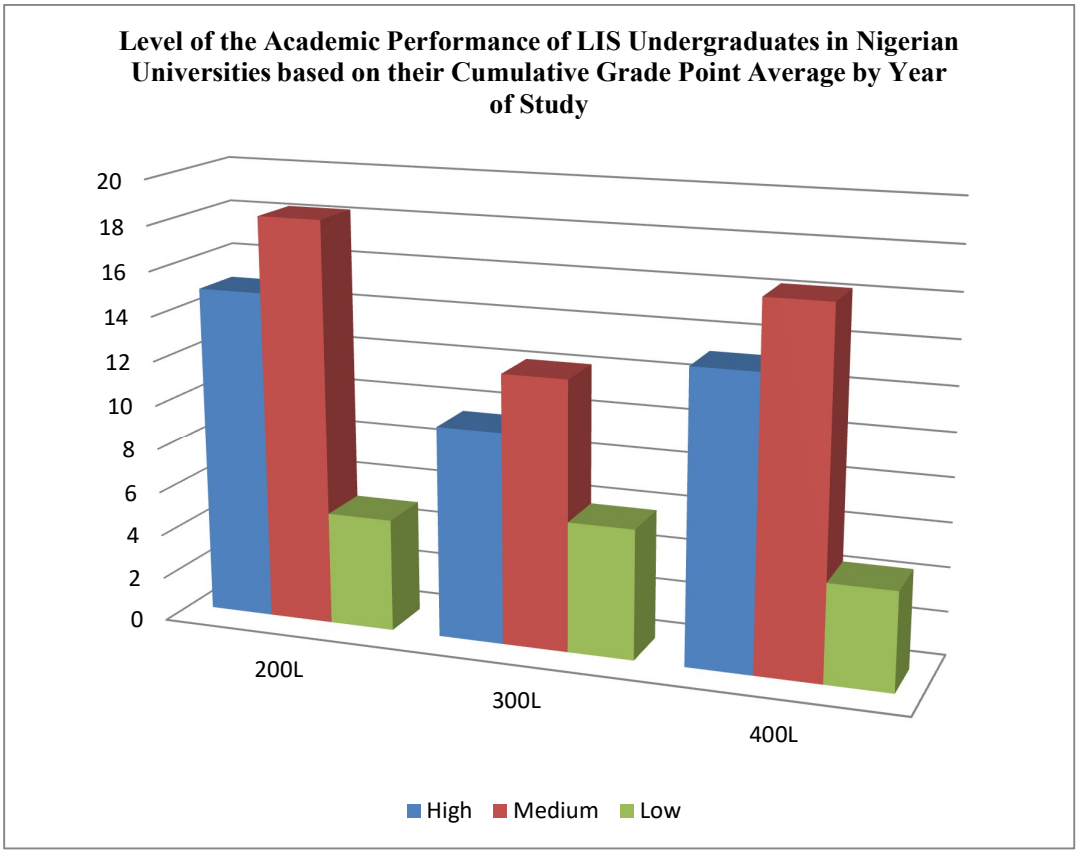

Figure: 4.2: Level of the academic performance of LIS undergraduates in Nigerian universities based on cumulative grade point average by year of study

Further analyses of the level of the academic performance of the respondents were done by the year of study of respondents in each university. These are presented in Figures 4.3 - 4.5.

Figures 4.3 – 4.5 revealed that all the universities had undergraduates with a high level of academic performance in all the years of study except BIU and MUA. For those in 200L, UNN had the highest number of respondents (34.8%) in the high category; KWASU had the highest number of respondents (34.0%) in the medium category while BIU had the highest number of respondents (20.0%) in the low category. For 300L, AUE had the highest respondents (31.6%) in the high category; TASUED had the highest respondents (21.2%) in the medium category while BIU and MUA had the highest respondents (20.0%) in the low category. For those in 400L, AUE and UNN had the highest respondents in the high category, 31.6% and 30.5% respectively. UI had the highest in the medium category (24.6%) while ATBU had the highest in the low category (25.7%). It could also be seen that all the respondents in 200L from AUE and 400L from BIU were in the high category. UNILORIN and UNN did not have respondents in the low category in all the years of study.

Therefore, the findings show that the academic performance of UNN, UNILORIN, UI, IMSU and AUE was high because the universities had more of the respondents in the high category. The academic performance of ABU, UNICAL, AAU, KWASU, TASUED, UMYU, BIU and MUA was fair because most of the respondents were in the medium category while the academic performance of ATBU was low because the majority of the respondents were in a low category. Thus, the academic performance of LIS undergraduates in Nigerian universities is on the average.

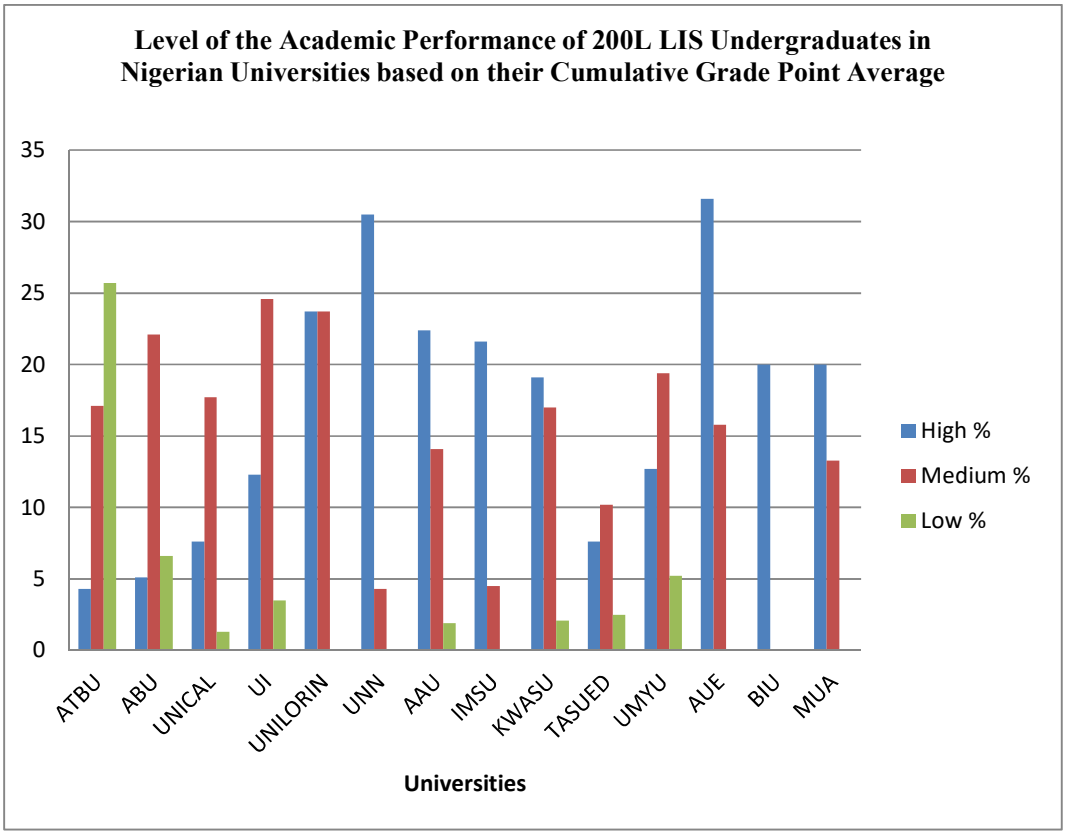

Figure: 4.3: The level of the academic performance of 200L LIS undergraduates in Nigerian universities based on their cumulative grade point average

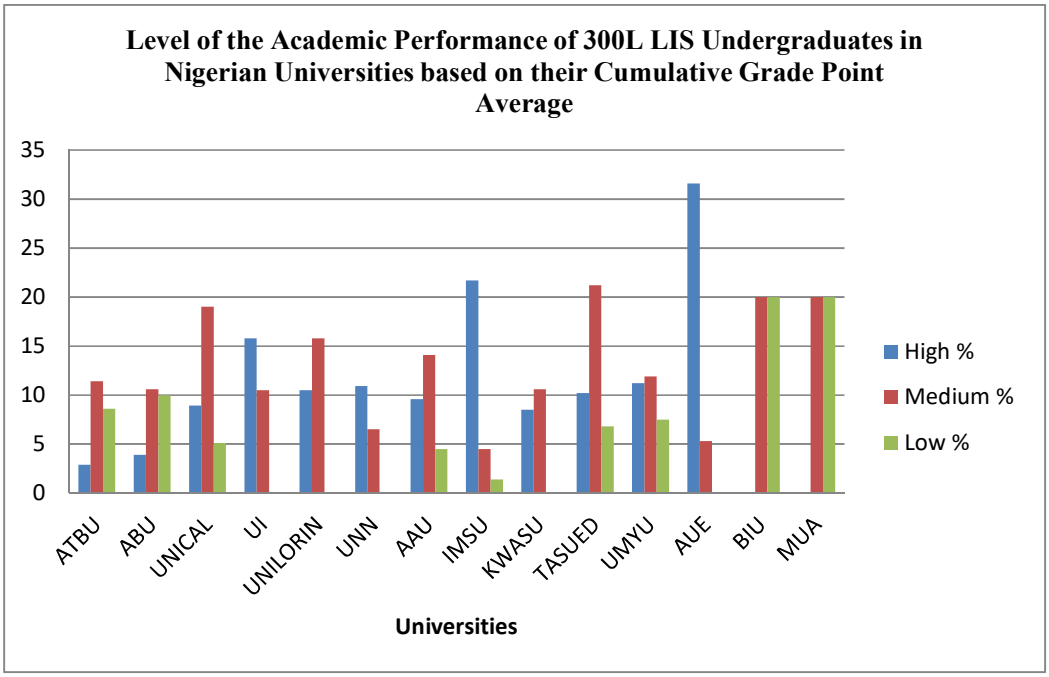

Figure: 4.4: The level of the academic performance of 300L LIS undergraduates in Nigerian universities based on their cumulative grade point average

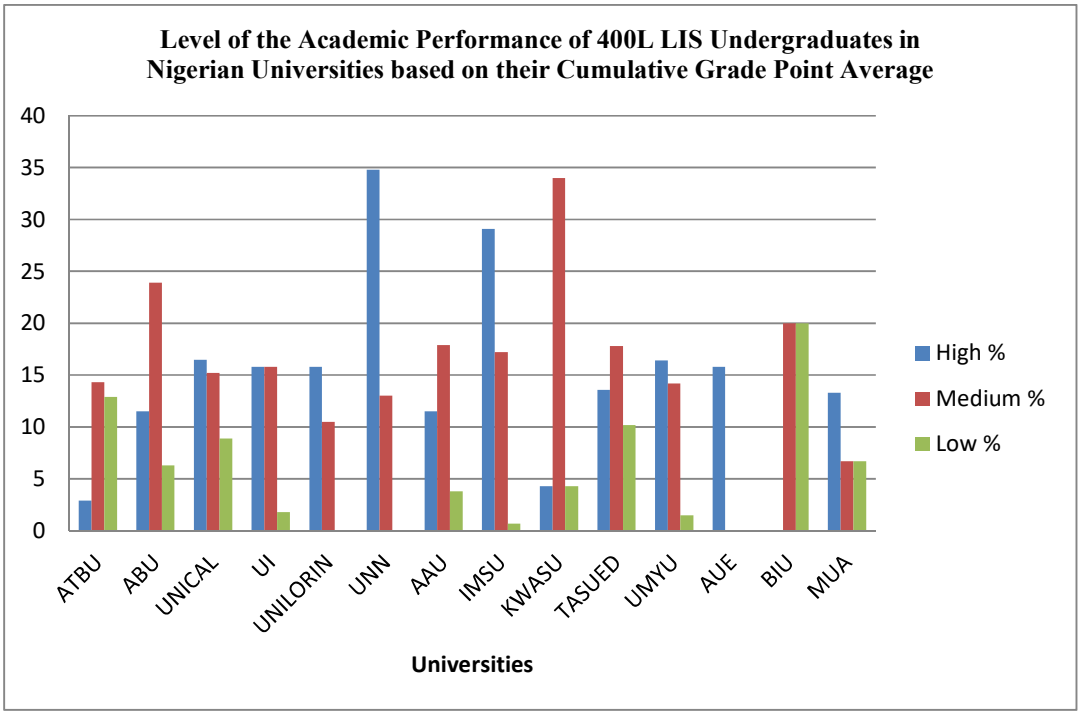

Figure: 4.5: The level of the academic performance of 400L LIS undergraduates in Nigerian universities based on their cumulative grade point average

Research question 2: What is the years of experience, frequency and point of accessing the web for academic activities by LIS undergraduates in Nigeria?

The description of web-searching behaviour of LIS undergraduates in Nigeria for academic purposes based on years of experience, frequency and point of access is as shown in Tables 4.2. In terms of the years of experience of searching the web by the LIS undergraduates for academic activities as shown in Table 4.2, the result shows that majority of the respondents (84.1%) had less than six months experience or had never surfed the web for academic activities (also, See Table 4.3). Furthermore, 5.6% had been surfing the web for over two years, while 10.3% had between one and two years of experience in surfing the web. More than half of the respondents (51.4%) occasionally engaged in surfing the web while almost a quarter (24.4%) never searched the web for academic purposes.

Table 4.2. Years of Experience, Frequency of Searching and Point of Accessing the Web by Respondents for Academic Activities

Items	Categories	N	%
i. Years of experience of searching the web	>2years	70	5.6
	2year	74	5.9
	1year	55	4.4
	<6months	1050	84.1
	Total	**1249**	**100**
ii. Frequency of web-searching	Never	305	24.4
	occasionally	642	51.4
	once a week	237	19.0
	2-3 times a week	32	2.6
	Daily	33	2.6
	Total	**1249**	**100**
iii. Point of access	on campus	3	0.2
	off-campus	49	3.9
	both	892	71.4
	None	305	24.5
	Total	**1249**	**100**

Considering the frequency of searching the web for academic activities by the LIS undergraduates as shown in Table 4.2, 19.0% used it once in a week, and only about 5.1% of the respondents engaged in surfing the web frequently (daily or 2-3 times a week). This is not surprising given that most of the respondents had less than six months or no experience at all in surfing the web for academic activities. The breakdown of this result is presented in Table 4.4

Table 4.2 also shows the point of accessing the web by the LIS undergraduates for academic activities. A minority of the respondents (0.2%) accessed the web on campus, while 3.9% claimed to access the web off-campus. Almost a quarter of the respondents (24.5%) did not access the web while on-campus or off-campus. However, the majority of the respondents that searched the web for academic activities (71.4%) claimed to access the web both on-campus and off-campus.

Further analyses of the description of web-searching behaviour of LIS undergraduates for academic activities was done by cross-tabulating the year of experience, the frequency of web-searching and point of accessing the web by the respondents in the various universities. This is presented in Tables 4.3 – 4.5.

Table 4.3. Distribution of Respondents by Universities on the Years of Experience of Searching the Web for Academic Activities

S/N	Universities	N	Years of experience of searching the web							
			<6months		1year		2year		>2years	
			N	%	N	%	N	%	N	%
1	ATBU	**70**	70	5.6	0	0.0	0	0.0	0	0.0
2	ABU	**331**	260	20.8	23	1.8	26	2.1	22	1.8
3	UNICAL	**79**	79	6.3	0	0.0	0	0.0	0	0.0
4	UI	**57**	0	0.0	4	0.3	27	2.2	26	2.1
5	UNILORIN	**38**	28	2.2	10	0.8	0	0.0	0	0.0
6	UNN	**46**	46	3.7	0	0.0	0	0.0	0	0.0
7	AAU	**156**	132	10.6	0	0.0	2	0.2	22	1.8
8	IMSU	**134**	97	7.8	18	1.4	19	1.5	0	0.0
9	KWASU	**47**	47	3.8	0	0.0	0	0.0	0	0.0
10	TASUED	**118**	118	9.4	0	0.0	0	0.0	0	0.0
11	UMYU	**134**	134	10.7	0	0.0	0	0.0	0	0.0
12	AUE	**19**	19	1.5	0	0.0	0	0.0	0	0.0
13	BIU	**5**	5	0.4	0	0.0	0	0.0	0	0.0
14	MUA	**15**	15	1.2	0	0.0	0	0.0	0	0.0
			1050	**84.1**	**55**	**4.4**	**74**	**5.9**	**70**	**5.6**
Total		**1249**	**1249**							

Table 4.4. Distribution of Respondents by Universities on the Frequency of Searching the Web for Academic Activities

S/N	Universities	n	Frequency of web-searching									
			Daily		2-3times a week		Once a week		Occasionally		Never	
			N	%	N	%	N	%	N	%	N	%
1	ATBU	**70**	0	0.0	0	0.0	0	0.0	0	0.0	70	5.6
2	ABU	**331**	0	0.0	0	0.0	0	0.0	331	26.5	0	0.0
3	UNICAL	**79**	0	0.0	0	0.0	0	0.0	19	1.5	60	4.8
4	UI	**57**	4	0.3	1	0.1	1	0.1	51	4.1	0	0.0
5	UNILORIN	**38**	0	0.0	0	0.0	0	0.0	38	3.0	0	0.0
6	UNN	**46**	0	0.0	0	0.0	0	0.0	46	3.7	0	0.0
7	AAU	**156**	0	0.0	0	0.0	27	2.2	129	10.3	0	0.0
8	IMSU	**134**	0	0.0	31	2.5	103	8.2	0	0.0	0	0.0
9	KWASU	**47**	0	0.0	0	0.0	0	0.0	11	0.9	36	2.9
10	TASUED	**118**	0	0.0	0	0.0	0	0.0	0	0.0	118	9.4
11	UMYU	**134**	10	0.8	0	0.0	106	8.5	17	1.4	1	0.1
12	AUE	**19**	19	1.5	0	0.0	0	0.0	0	0.0	0	0.0
13	BIU	**5**	0	0.0	0	0.0	0	0.0	0	0.0	5	0.4
14	MUA	**15**	0	0.0	0	0.0	0	0.0	0	0.0	15	1.2
			33	**2.6**	**32**	**2.6**	**237**	**19.0**	**642**	**51.4**	**305**	**24.4**
Total		**1249**	**1249**									

Table 4.5. Distribution of Respondents by Universities on the Point of Accessing the Web for Academic Activities

S/N	Universities	N	Point of Accessing the Web							
			On-campus		Off-campus		Both		None	
			N	%	N	%	N	%	N	%
1	ATBU	**70**	0	0.0	0	0.0	0	0.0	70	5.6
2	ABU	**331**	0	0.0	0	0.0	331	26.5	0	0.0
3	UNICAL	**79**	0	0.0	0	0.0	19	1.5	60	4.8
4	UI	**57**	0	0.0	0	0.0	57	4.6	0	0.0
5	UNILORIN	**38**	0	0.0	0	0.0	38	3.0	0	0.0
6	UNN	**46**	0	0.0	0	0.0	46	3.7	0	0.0
7	AAU	**156**	0	0.0	0	0.0	156	12.5	0	0.0
8	IMSU	**134**	0	0.0	0	0.0	134	10.7	0	0.0
9	KWASU	**47**	0	0.0	0	0.0	11	0.9	36	2.9
10	TASUED	**118**	0	0.0	0	0.0	0	0.0	118	9.4
11	UMYU	**134**	3	0.2	49	3.9	81	6.5	1	0.1
12	AUE	**19**	0	0.0	0	0.0	19	1.5	0	0.0
13	BIU	**5**	0	0.0	0	0.0	0	0.0	5	0.4
14	MUA	**15**	0	0.0	0	0.0	0	0.0	15	1.2
Total		**1249**	**3**	**0.2**	**49**	**3.9**	**892**	**71.4**	**305**	**24.4**

The result in Table 4.3 shows that majority of the respondents in all the universities had less than a year experience of searching the web for academic activities. However, all the respondents from UI had at least one year of experience, although only a few (0.5%) searched the web at least once a week. The respondents that had over two years or two years of web-searching experience were from UI (4.2%), ABU (3.9%) and AAU (3.8%). In terms of frequency of searching the web (Table 4.4), however, all the respondents from AUE surf the web daily even though they had less than six months experience. All the respondents from IMSU and 9.3% of UMYU also engaged in surfing the web at least twice a week.

The point of accessing the web for academic activities by the respondents in the various universities in this study is indicated in Table 4.5. The finding shows that of the LIS undergraduates that accessed the web for academic activities, the respondents from ABU, UI, UNILORIN, UNN, AAU, IMSU, and AUE amounting to 71.4% of the total sample size, used both on-campus and off-campus as the point of accessing the web. Only three and 49 respondents from UMYU accessed the web on and off-campus, respectively.

Research question 3: What are the search engines, web browsers, online information search strategies, and seeking processes frequently used for academic activities by LIS undergraduates in Nigeria?

The general description of search engines, web browsers, online information search strategies, and seeking processes frequently used for academic activities by LIS undergraduates in Nigeria is as shown in Table 4.6. In order to profile the web-searching behaviour of the respondents when searching the web for academic activities, the online information search strategies used by the respondents were analysed. The analysis was done based on Tsai and Tsai Framework (Tsai, 2009) while the online information seeking processes used by the respondents were analysed based on Ellis' Model of Information Seeking Behaviour (Wilson, 1999; Choo Detlor and Turnbull, 1999).

Table 4.6. Search Engines, Web Browsers, Online Information Search Strategies and Seeking Processes Used by Respondents for Academic Activities

Items	Categories	N	%
Search engines	Google	1071	85.7
	Yahoo	625	50.0
	Ask.com	446	35.6
	Bing	356	28.5
	Google Scholar	179	14.3
	N	**1249**	
Web browsers	Mozilla	1070	85.7
	Internet Explorer	983	78.6
	Google Chrome	981	78.6
	Opera	357	28.5
	n	**1249**	
	Strategies	**Mean ($\bar{x}$)**	**SD**
Online information search strategies	**Behavioural Strategies**		
	Disorientation	4.118	1.348
	Control	4.083	1.382
	Average Mean	**4.101**	**1.365**
	Procedural Strategies		
	Problem Solving	4.133	1.549
	Trial and Error	4.036	1.546
	Average Mean	**4.085**	**1.548**
	Metacognitive Strategies		
	Evaluation	4.034	1.315
	Purposeful Thinking	3.860	1.355
	Select Main Ideas	3.829	1.305
	Average Mean	**3.908**	**1.325**
	Processes		
Online information seeking processes	Chaining	4.337	1.432
	Differentiating	4.184	1.575
	Starting	4.169	1.339
	Extracting	4.118	1.509
	Monitoring	4.078	1.493
	Browsing	3.612	1.630
	Average Mean	**4.083**	**1.496**

The most frequently used search engines for academic activities by the majority of the respondents were Google (85.7%) and Yahoo (50.0%) while Mozilla (85.7%), Internet Explorer (78.6%) and Google Chrome (78.6%) were the frequently used web browsers. The online information search strategies were categorised into three domains (*behavioural strategies, procedural strategies* and *metacognitive strategies)* with seven sub-groups (*disorientation, control, problem-solving, trial and error, evaluation, purposeful thinking and select main ideas)* based on Tsai and Tsai Framework while the online information seeking processes were grouped into six based on Ellis' Model of Information Seeking Behaviour.

The result in Table 4.6 shows that *behavioural strategies* were the most utilised strategies among the LIS undergraduates ($\bar{x}$ = 4.101, SD = 1.365) and *disorientation* was the most common strategy in this domain ($\bar{x}$ = 4.118, SD = 1.348). The second most utilised strategies were the *procedural strategies* ($\bar{x}$ = 4.085, SD = 1.548) with *problem-solving* as the most prevalent strategy ($\bar{x}$ = 4.133, SD = 1.549) used by the LIS undergraduates in this domain. *Metacognitive strategies* were the least used ($\bar{x}$ = 3.908, SD = 1.325) and *evaluation* was the most used strategy ($\bar{x}$ = 4.034, SD = 1.315) in this domain. However, looking at the online information search strategies generally, *problem-solving* had the highest mean ($\bar{x}$ = 4.133, SD = 1.549) while *select main ideas* had the least mean ($\bar{x}$ = 3.829, SD = 1.305).

Considering the online information seeking processes, it was observed that almost all the processes in the Ellis' Model, that is, *starting, chaining, browsing, monitoring, differentiating and extracting,* were equally used by the respondents although there seemed to be higher preference for *chaining* process ($\bar{x}$ = 4.337, SD = 1.432) while *browsing* process ($\bar{x}$ = 3.612, SD = 1.630) was the least used. Further analyses of the search engines and web browsers frequently used by the respondents for academic activities are as presented in Figures 4.6 and 4.7 (See Appendix II, Table 4.7).

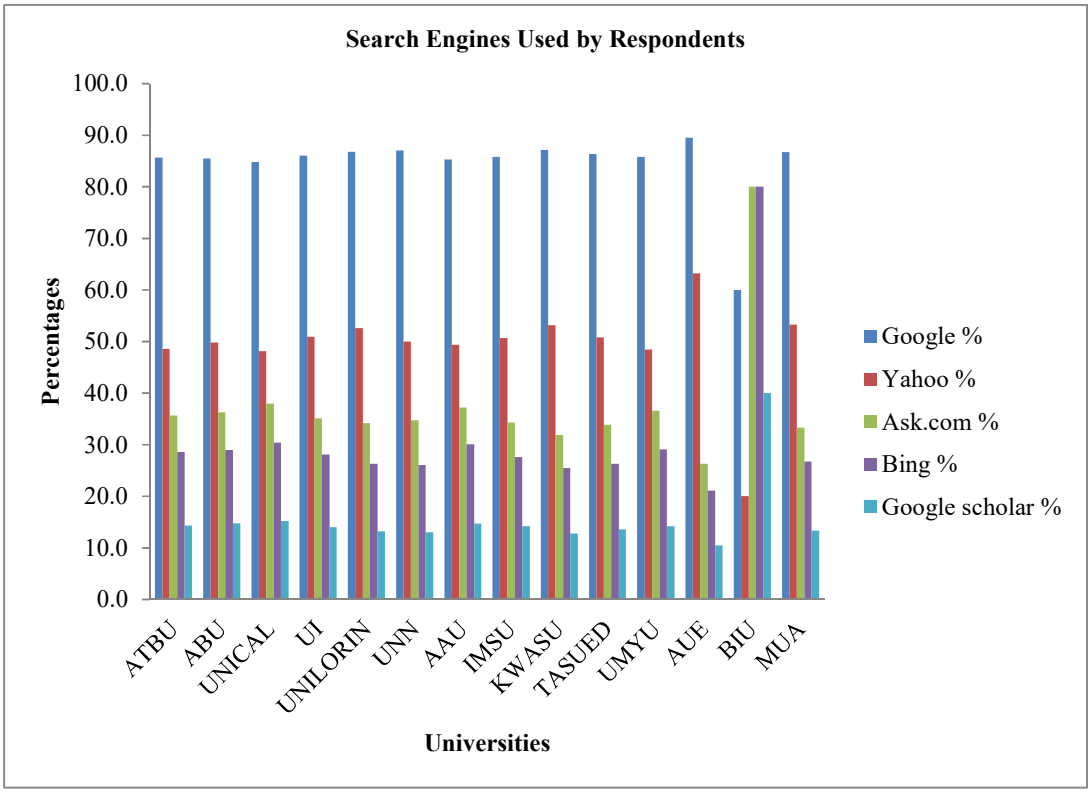

Figure: 4.6: Search Engines Used by Respondents in the Universities for Academic Activities

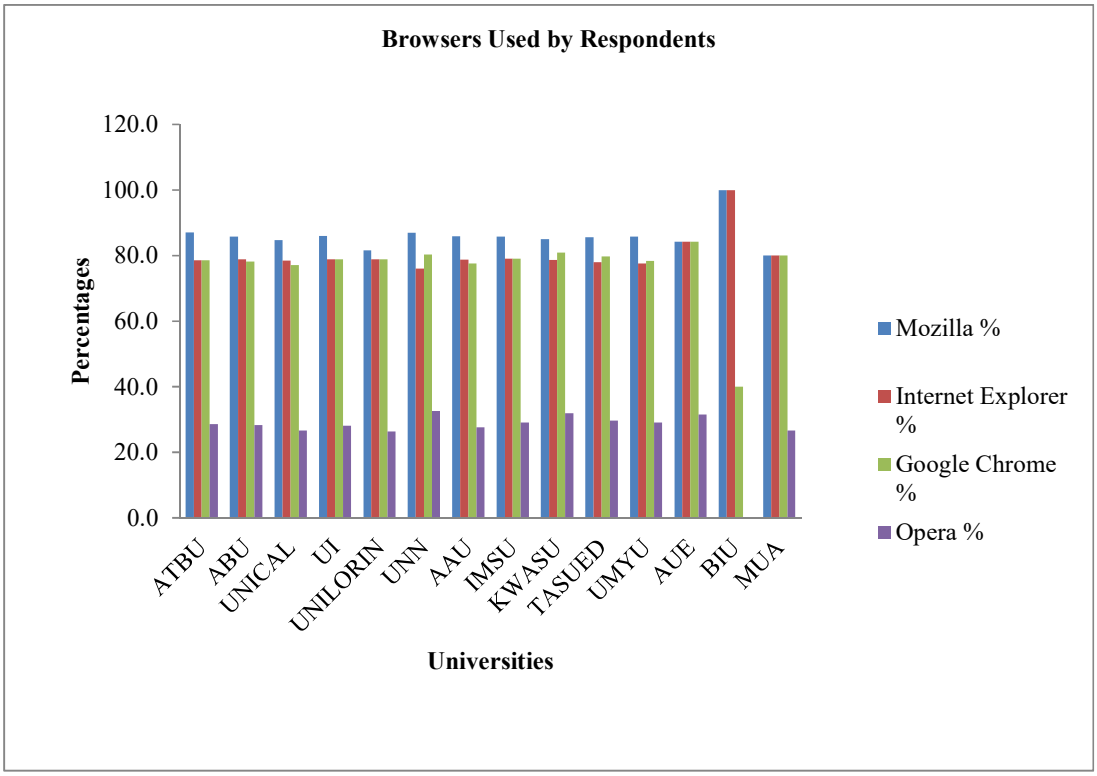

Figure: 4.7: Web Browsers Used by Respondents in the Universities for Academic Activities

The result in Figure 4.6 shows that more than 80.0% of the respondents in all the universities except BIU used Google search engine. Eighty per cent of respondents from BIU used Ask.com and Bing search engines. Furthermore, Figure 4.7 shows that 77.7% to 87.0% of the respondents in all the universities indicated using Mozilla and Internet Explorer web browsers except BIU, where all the respondents used the two web browsers.

More details of the respondents in all the universities on the online information search strategies (*behavioural strategies, procedural strategies* and *metacognitive strategies)* are presented in Tables 4.8a and 4.8b. The strategies were established on Tsai and Tsai Framework.

It could be seen in Tables 4.8a and 4.8b that, under *disorientation strategy*, 85.8% of the respondents did not know how to start online searching ($\bar{x}$ = 4.60, SD = 1.40), 80.9% felt nervous when searching for information on the Internet ($\bar{x}$ = 4.44, SD = 1.19) while only 36.7% 'always felt lost while searching for information on the Internet. On the other hand however under the *control strategy*, 83.7% of the respondents knew how to utilize advanced-search functions provided by search engines ($\bar{x}$ = 4.55, SD = 1.09) and 61.2% looked through the titles or hyperlinks in order to get the main ideas in a webpage ($\bar{x}$ = 3.75, SD = 1.19). 81.2% of the respondents thought of some resolutions when they were frustrated with searching problems using *problem-solving strategy* ($\bar{x}$ = 4.36, SD = 1.47) while 65.6% ($\bar{x}$ = 4.09, SD = 1.45) tried some possible entrance websites when they cannot find enough information using *trial and error strategy*.

In addition, 75.9% of the respondents used the *evaluation strategy* by comparing information that has been collected from different websites ($\bar{x}$ = 4.32, SD = 1.29), 64.6% engaged in *purposeful thinking strategy* by usually making sure of the goals before starting online searching ($\bar{x}$ = 4.21, SD = 1.40) and 67.3% used *select main ideas strategy* by looking through titles or hyperlinks in a web in order to catch significant information. One of the items under *purposeful thinking strategy,* 'I keep on reminding myself of the purpose of searching online', was the least activity ($\bar{x}$ = 3.32, SD = 1.13) engaged in by 78.8% of the respondents.

Table 4.8a. Online Information Search Strategies Used by Respondents for Academic Activities

Online Information Searching Strategies														
Behavioural Domain	**Not very much like me**		**Not very much like me**		**Somewhat not like me**		**Somewhat like me**		**Like me**		**Very much like me**		**Mean**	**STD**
Disorientation	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**		
I don't have a clue how to start my online searching.	106	8.5	12	0.9	59	4.7	272	21.7	453	36.3	347	27.8	4.60	1.40
I generally feel apprehensive when I scan for information on the Internet.	33	2.6	25	2.0	181	14.5	408	32.6	326	26.1	277	22.2	4.44	1.19
I don't have a clue of what to do when I scan for information on the Internet.	28	2.2	60	4.8	657	52.6	93	7.5	203	16.2	208	16.7	3.81	1.31
I generally feel lost while looking through information on the Internet.	104	8.3	99	7.9	587	47.0	24	1.9	239	19.1	196	15.7	3.63	1.49
												Average Mean	**4.118**	**1.348**
Control	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Mean**	**STD**
I can use complex-search features furnished by search engines.	12	0.9	12	0.9	180	14.4	421	33.7	325	26	299	24	4.55	1.09
I can log in a specified website using the URL address.	85	6.8	178	14.3	126	10.1	239	19.2	306	24.5	315	4.12	1.35	1.59
I can utilise web browsers like Internet explorer, Google chrome and opera.	143	11.5	166	13.3	229	18.3	112	9.0	368	29.4	231	18.5	3.87	1.66
To get the most important ideas in a webpage, I ordinarily glance thru the titles or hyperlinks.	73	5.8	65	5.2	346	27.7	481	38.5	184	14.7	100	8.0	3.75	1.19
												Average Mean	**4.083**	**1.382**
Procedural Domain														
Problem-solving	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Mean**	**STD**
I am resolute in my thinking when I am baffled with search problems.	106	8.5	71	5.7	56	4.5	347	27.7	367	29.4	301	24.1	4.36	1.47
I generally quit my search when I cannot resolve difficulties.	100	8.0	92	7.4	104	8.3	461	36.9	296	23.7	195	15.7	4.08	1.40
I do all I can in resolving any difficulties I came about in a search.	181	14.5	169	13.6	114	9.1	119	9.5	386	30.9	280	22.4	3.96	1.77
												Average Mean	**4.133**	**1.549**

Table 4.8b. Online Information Search Strategies Used by Respondents for Academic Activities

Trial and error	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Mean**	**STD**
I attempt some feasible entrance sites when I cannot discover sufficient information.	86	6.9	74	6	269	21.5	273	21.8	299	24	247	19.8	4.09	1.45
When my search is unsuccessful, I attempt other databases.	115	9.2	136	10.9	141	11.3	232	18.6	420	33.6	205	16.4	4.06	1.54
I strive to search other search engines when my search is not successful.	148	11.8	158	12.6	151	12.1	154	12.3	421	33.7	217	17.4	3.96	1.65
												Average Mean	**4.036**	**1.546**
Metacognitive Domain														
Evaluation	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Mean**	**STD**
I evaluate information that has been amassed from distinctive websites.	47	3.7	47	3.7	208	16.7	383	30.7	292	23.4	273	21.8	4.32	1.29
I continue assessing the connections among the information searched from the web.	40	3.2	40	3.2	196	15.7	510	40.8	273	21.8	189	15.1	4.20	1.17
I think ahead on the presentation and categorisation of the data that I have searched from the web.	113	9.0	113	9	152	12.1	410	32.8	326	26.1	135	10.8	3.90	1.41
I determine if the records supplied in a web page is really worth for reference.	75	6.0	134	10.8	420	33.6	238	19.0	208	16.7	174	13.9	3.71	1.40
												Average Mean	**4.034**	**1.315**
Purposeful thinking	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Mean**	**STD**
I normally make sure of the objectives before beginning my on-line searching.	59	4.7	77	6.2	307	24.6	126	10.1	455	36.4	226	18.1	4.21	1.40
Occasionally, I stop to contemplate what information is inadequate.	91	7.3	81	6.5	390	31.2	32	2.6	434	34.7	221	17.7	4.04	1.51
I consider how to make use of the searched information.	56	4.5	64	5.1	519	41.6	196	15.7	179	14.4	235	18.8	3.87	1.38
I kept prompting myself of the motive for looking through on the web.	59	4.7	103	8.3	103	8.3	742	59.4	174	13.9	68	5.5	3.32	1.13
												Average Mean	**3.860**	**1.355**
Select main ideas	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**		
In order to capture key information on an internet page, I glance through titles or hyperlinks in a web.	91	7.3	97	7.8	221	17.7	431	34.5	303	24.3	106	8.5	3.86	1.31
Most often, I think in advance of the keywords to use in search.	48	3.9	120	9.6	455	36.5	243	19.5	148	11.8	234	18.7	3.82	1.39
As feasible as I can, select essential ideas furnished on each webpage.	42	3.4	57	4.6	487	39.0	351	28.1	137	11.0	174	13.9	3.81	1.23
												Average Mean	**3.829**	**1.305**

More details of the online information seeking processes (*starting, chaining, browsing, monitoring, differentiating and extracting)* are presented in Table 4.9. These processes were based on Ellis' Model of Information Seeking Behaviour.

Details of the online information seeking processes as provided in Table 4.9 indicate that, following links on starting pages to other content-related sites, a *chaining* process, had the highest mean ($\bar{x}$ = 4.34, SD = 1.43) and was used by 68.1% of the respondents followed by *differentiating* process, that is, selecting useful pages and sites by bookmarking, printing, copying and pasting among others ($\bar{x}$ = 4.18, SD = 1.58). *Browsing* process in terms of scanning the web page by looking through items such as tables of contents, lists of titles, subject headings, names of organisations or persons, abstracts and summaries, was the least used ($\bar{x}$ = 3.61, SD = 1.63) of the processes.

Table 4.9. Online Information Seeking Processes Used by Respondents for Academic Activities

Online Information Seeking Processes														
	Not like me at all		Not very much like me		Somewhat not like me		Somewhat like me		Like me		Very much like me			
	N	%	N	%	N	%	N	%	N	%	N	%	Mean	STD
Chaining														
I monitor hyperlinks on beginning pages to other related content sites.	90	6.5	40	2.9	217	15.6	254	18.2	389	27.9	308	22.1	**4.34**	**1.43**
Differentiating														
I bookmark, print, copy and paste to select useful pages and sites.	121	8.7	140	10.1	150	10.8	177	12.7	485	34.8	278	20.0	**4.18**	**1.58**
Extraction														
To extract information of importance from a local site, I methodically search the site.	111	8.0	84	6.0	308	22.1	202	14.5	402	28.9	286	20.5	**4.12**	**1.51**
Starting														
I recognise websites/pages comprising or directing to information of interest.	45	3.2	44	3.2	405	29.1	319	22.9	231	16.6	313	22.5	**4.17**	**1.34**
Monitoring														
For new information, I revisit preferred websites.	80	5.7	111	8.0	340	24.4	154	11.1	365	26.2	270	19.4	**4.08**	**1.49**
Browsing														
I examine the whole page by way of searching through tables of contents, lists of titles, challenging headings, names of agencies or persons, abstracts and summaries, and so on.	181	13.0	142	10.2	469	33.7	88	6.3	270	19.4	243	17.4	**3.61**	**1.63**

Moreover, the summary of online information searching strategies and seeking processes for all the participants in each of the universities was as detailed in Tables 4.10 and 4.11. The pattern, as described above, was similar in all the universities.

Table 4.10 shows that BIU had the highest mean scores ($\overline{x}$ = 4.642, SD = 0.954; $\overline{x}$ = 4.292, SD = 1.417 and $\overline{x}$ = 4.189, SD = 0.961) respectively in all the three domains of the online information searching strategies. This was followed by UI ($\overline{x}$ = 4.203, SD = 1.298) and UNN ($\overline{x}$ = 4.201, SD = 1.196 for behavioural domain. MUA had the second highest mean scores ($\overline{x}$ = 4.222, SD = 1.639 and $\overline{x}$ = 4.067, SD = 1.139) respectively for procedural and metacognitive domains.

Table 4.10. Distribution of Respondents by Mean and Standard Deviation of Online Information Searching Strategies Used for Academic Activities

Universities	n	Online Information Searching Strategies					
		Behavioural Domain		Procedural Domain		Metacognitive Domain	
		Mean	SD	Mean	SD	Mean	SD
ATBU	**70**	4.014	1.240	4.032	1.616	3.944	1.266
ABU	**331**	4.115	1.358	4.080	1.564	3.897	1.306
UNICAL	**79**	4.112	1.383	4.137	1.565	3.839	1.310
UI	**57**	4.203	1.298	4.147	1.497	3.797	1.285
UNILORIN	**38**	4.082	1.240	4.087	1.569	3.943	1.280
UNN	**46**	4.201	1.196	4.027	1.458	3.946	1.294
AAU	**156**	4.129	1.371	4.101	1.555	3.885	1.299
IMSU	**134**	4.161	1.384	4.110	1.526	3.852	1.323
KWASU	**47**	4.187	1.195	4.011	1.481	3.941	1.295
TASUED	**118**	4.134	1.376	4.075	1.540	3.867	1.317
UMYU	**134**	4.136	1.367	4.089	1.553	3.897	1.309
AUE	**19**	4.180	1.047	3.886	1.210	3.808	1.231
BIU	**5**	4.642	0.954	4.292	1.417	4.189	0.961
MUA	**15**	4.121	1.026	4.222	1.639	4.067	1.139
Total	**1249**	**4.101**	**1.365**	**4.085**	**1.548**	**3.908**	**1.325**

Table 4.11 also indicated that for the online information seeking processes, BIU had the highest mean scores for extraction ($\overline{x}$ = 4.800, SD = 0.837) and browsing ($\overline{x}$ = 4.800, SD = 1.304) processes. AUE and BIU had the highest mean scores ($\overline{x}$ = 4.600, SD = 1.352; $\overline{x}$ = 4.600, SD = 0.894) respectively for chaining process followed by ATBU ($\overline{x}$ = 4.538, SD = 1.448).

Table 4.11. Distribution of Respondents by Mean and Standard Deviation of Online Information Seeking Processes Used for Academic Activities

Universities	n	Online Information Seeking Processes											
		Chaining		Differentiating		Starting		Extraction		Monitoring		Browsing	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ATBU	**70**	4.538	1.448	4.075	1.645	3.957	1.277	4.594	1.310	4.061	1.369	3.420	1.528
ABU	**331**	4.376	1.450	4.177	1.578	4.179	1.342	4.172	1.498	4.122	1.476	3.599	1.650
UNICAL	**79**	4.280	1.448	4.468	1.404	4.427	1.406	3.823	1.575	4.130	1.567	3.620	1.800
UI	**57**	4.056	1.406	4.491	1.364	4.528	1.381	3.649	1.541	4.000	1.656	3.772	1.803
UNILORIN	**38**	4.556	1.383	4.036	1.662	3.948	1.317	4.379	1.461	4.109	1.423	3.621	1.543
UNN	**46**	4.311	1.443	3.761	1.741	3.920	1.192	4.380	1.413	4.000	1.446	3.640	1.411
AAU	**156**	4.285	1.462	4.236	1.545	4.223	1.362	4.025	1.512	4.182	1.488	3.627	1.673
IMSU	**134**	4.311	1.414	4.263	1.535	4.287	1.370	3.972	1.563	4.029	1.555	3.615	1.687
KWASU	**47**	4.279	1.453	3.795	1.720	3.875	1.231	4.417	1.427	3.907	1.444	3.667	1.434
TASUED	**118**	4.294	1.420	4.214	1.574	4.160	1.346	4.089	1.523	4.039	1.508	3.600	1.622
UMYU	**134**	4.315	1.424	4.168	1.578	4.155	1.349	4.157	1.495	4.033	1.499	3.635	1.628
AUE	**19**	4.600	1.352	3.533	1.959	3.632	0.955	3.684	1.565	4.000	1.414	3.316	0.946
BIU	**5**	4.600	0.894	3.800	1.924	4.200	1.643	4.800	0.837	3.000	1.633	4.800	1.304
MUA	**15**	4.143	1.748	4.467	1.457	4.200	1.207	4.467	1.457	4.467	1.506	3.733	1.907
Total	**1249**	**4.337**	**1.432**	**4.184**	**1.575**	**4.169**	**1.339**	**4.118**	**1.509**	**4.078**	**1.493**	**3.612**	**1.630**

Research question 4: What are the mobile technologies and applications frequently used for academic activities by LIS undergraduates in Nigeria?

The summary of the mobile technologies used by LIS undergraduates for academic activities is as presented in Table 4.12. The pattern seen in Table 4.12 was also reflected by the respondents in almost all the universities, as shown in Table 4.13 (See Appendix II). Detailed information of respondents from each of the University that frequently used the Laptop, Smartphone and Tablet PC for academic activities is as presented in Table 4.14

It could be seen in Table 4.12 that the Laptop (86.1%) and the Smartphone (84.5%) were the most frequently used (at least once a week) mobile technologies for academic activities by the respondents while e-book reader (46.5%). The respondents did not frequently use the PDA (44.7%) for academic activities. A substantial number of the undergraduates also used Tablet PC (61.3%) at least once a week for academic activities. Only 10.2% and 8.7% of the respondents indicated that they had never used the Smartphone or the Laptop, respectively, for academic activities. The same pattern seen in Table 4.12 was also reflected by the respondents in almost all the universities, as shown in Table 4.13 (See Appendix II).

Table 4.12. Mobile Technologies Used by Respondents for Academic Activities

Frequency of Use	Mobile Technologies									
	Smartphone		Tablet PC		eBook Readers		PDA		Laptop etc	
	N	%	N	%	N	%	N	%	N	%
Daily	977	78.2	264	21.1	357	28.6	243	19.5	904	72.4
2-3times a week	34	2.7	19	1.5	4	0.3	4	0.3	27	2.2
Once a week	44	3.5	482	38.6	220	17.6	313	25.1	145	11.6
Occasionally	67	5.36	45	3.6	64	5.12	90	7.21	65	5.2
Never	127	10.2	439	35.1	604	48.4	599	48.0	108	8.65
Total	**1249**	**100**	**1249**	**100**	**1249**	**100**	**1249**	**100**	**1249**	**100**

Table 4.14 gives detailed information about the mobile technologies, that is, the Laptop, Smartphone and Tablet, used at least once a week by the respondents in the universities for academic activities. In the private-owned universities, all the respondents from BIU used the laptop, the smartphone and the tablet frequently, while all the respondents from MUA used the laptop frequently. In the state universities category, 91.5% and 87.2% of respondents from KWASU, 87.3% and 85.8% of respondents from UMYU, 87.2% and 85.9% of respondents from AAU frequently used the laptops and the smartphones for academic activities respectively. Eighty per cent of the respondents from UNILORIN used the laptop, 85.7% of respondents from ATBU used the smartphones, while 67.4% of respondents from UNN in the federal universities category used the tablet PC.

Table 4.14. Frequencies and Percentages of the Mobile Technologies Frequently Used by Respondents for Academic Activities

S/N	Universities	n	Laptop		Smartphone		Tablet	
			N	%	N	%	N	%
1	ATBU	**70**	60	85.7	60	85.7	44	62.9
2	ABU	**331**	285	86.1	278	84.0	198	59.8
3	UNICAL	**79**	67	84.8	65	82.3	49	62.0
4	UI	**57**	48	84.2	47	82.5	34	59.6
5	UNILORIN	**38**	33	86.8	32	84.2	23	60.5
6	UNN	**46**	38	82.6	39	84.8	31	67.4
7	AAU	**156**	136	87.2	134	85.9	103	66.0
8	IMSU	**134**	115	85.8	112	83.6	86	64.2
9	KWASU	**47**	43	91.5	41	87.2	26	55.3
10	TASUED	**118**	100	84.7	100	84.7	72	61.0
11	UMYU	**134**	117	87.3	115	85.8	79	59.0
12	AUE	**19**	14	73.7	14	73.7	10	52.6
13	BIU	**5**	5	100.0	5	100.0	5	100.0
14	MUA	**15**	15	100.0	12	80.0	5	33.3
Total		**1249**	**1076**	**86.1**	**1055**	**84.5**	**765**	**61.2**

The mobile applications used by the LIS undergraduates for academic activities are as described in Table 4.15. The data in Table 4.15 shows that the respondents used Skype, Dropbox, Dictionary.com, Microsoft office mobile, Google drive and Vocabulary builder mobile applications on the laptops and the tablet PCs for academic activities. Google drive (62.3%), Vocabulary builder (56.3%) and Microsoft Office mobile (47.7%) were the most frequently used mobile applications. All the respondents used Vocabulary builder and Dictionary.com on all their mobile technologies while Coursera mobile application, which was the least used (4.7%) of the mobile applications, was only used by the respondents on Laptops. None of the respondents used any of the mobile applications on eBook Reader or PDA since these two mobile technologies were the least used of mobile technologies by the respondents for academic activities.

Table 4.15. Mobile Applications used by Respondents for Academic Activities

Mobile Applications	Smartphone		Tablet PC		eBook Reader		PDA		Laptops	
	N	%	N	%	N	%	N	%	N	%
Skype	-	-	29	2.3	-	-	-	-	427	34.2
Dropbox	-	-	383	30.7	-	-	-	-	441	35.3
Dictionary.com	97	7.6	383	30.7	-	-	-	-	441	35.3
Microsoft office mobile	-	-	383	30.7	-	-	-	-	596	47.7
Google drive	-	-	383	30.7	-	-	-	-	778	62.3
Coursera	-	-	-	-	-	-	-	-	59	4.7
Vocabulary builder	215	17.2	703	56.3	-	-	-	-	331	26.5

The distribution of the respondents by mobile applications used on mobile technologies for academic activities in each university is also, as shown in Table 4.16. A look at the result presented in Table 4.16 shows that all the respondents in all the university categories used Vocabulary builder and Google drive mobile applications for academic activities. In the private universities category, all respondents from BIU made use of all the mobile applications for academic activities while all respondents from AUE also used all the applications except Skype (52.6%). In the state universities category, KWASU had the highest percentage of respondents that used Microsoft office mobile (83.0%), Dictionary.com (78.7%) and Dropbox (70.2%) mobile applications. In

the federal universities category also, UNILORIN had the highest percentages of respondents that used Microsoft office mobile (81.6%), Dictionary.com (78.9%) and Dropbox (71.1%) mobile applications for academic activities.

Table 4.16. Distribution of Respondents by Mobile Applications used for Academic Activities

S/N	Universities	n	Skype		Dropbox		Dictionary.com		Microsoft office mobile		Google drive		Coursera		Vocabulary Builder	
			N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	ATBU	**70**	29	41.4	42	60.0	48	68.6	52	74.3	65	92.9	5	7.1	70	100.0
2	ABU	**331**	113	34.1	212	64.0	238	71.9	255	77.0	306	92.4	16	4.8	331	100.0
3	UNICAL	**79**	30	38.0	53	67.1	57	72.2	61	77.2	73	92.4	4	5.1	79	100.0
4	UI	**57**	15	26.3	28	49.1	36	63.2	40	70.2	52	91.2	2	3.5	57	100.0
5	UNILORIN	**38**	16	42.1	27	71.1	30	78.9	31	81.6	35	92.1	1	2.6	38	100.0
6	UNN	**46**	14	30.4	32	69.6	36	78.3	37	80.4	43	93.5	2	4.3	46	100.0
7	AAU	**156**	58	37.2	102	65.4	114	73.1	122	78.2	145	92.9	8	5.1	156	100.0
8	IMSU	**134**	46	34.3	92	68.7	101	75.4	107	79.9	125	93.3	6	4.5	134	100.0
9	KWASU	**47**	15	31.9	33	70.2	37	78.7	39	83.0	45	95.7	2	4.3	47	100.0
10	TASUED	**118**	46	39.0	80	67.8	89	75.4	94	79.7	110	93.2	6	5.1	118	100.0
11	UMYU	**134**	58	43.3	85	63.4	97	72.4	103	76.9	124	92.5	7	5.2	134	100.0
12	AUE	**19**	10	52.6	19	100.0	19	100.0	19	100.0	19	100.0	0	0.0	19	100.0
13	BIU	**5**	5	100.0	5	100.0	5	100.0	5	100.0	5	100.0	0	0.0	5	100.0
14	MUA	**15**	1	6.7	14	93.3	14	93.3	14	93.3	14	93.3	0	0.0	15	100.0
Total		**1249**	**456**	**36.5**	**824**	**66.0**	**921**	**73.7**	**979**	**78.4**	**1161**	**93.0**	**59**	**4.7**	**1249**	**100.0**

Research question 5: What are the academic activities performed on mobile devices by LIS undergraduates in Nigeria?

The academic activities performed on mobile devices by LIS undergraduates in Nigeria is as presented in Table 4.17. The academic activities performed by the respondents on mobile devices with the highest mean as shown in Table 4.17 were searching online databases such as journals or publications and communicating on social media sites (such as Facebook or Twitter) about academic studies ($\bar{x}$ = 5.31, SD = 0.57). These were followed by participating in interactive class activities (e.g., group discussion, collaborative writing) ($\bar{x}$ = 4.99, SD = 0.10) and listening to course audio materials (such as lectures or podcasts) ($\bar{x}$ = 4.98, SD = 0.36). The least performed academic activities on mobile technologies by the LIS undergraduates were sending and receiving emails (to/from the course leader or other students) ($\bar{x}$ = 1.99, SD = 0.83), searching the Internet for course-related information ($\bar{x}$ = 1.99, SD = 0.82) and registering courses ($\bar{x}$ = 1.33, SD = 0.49).

Table 4.17. Academic Activities Performed by LIS Undergraduates using Mobile Devices

	Academic Activities	Mean	SD
a	Searching online databases such as journals or publications	5.31	0.57
b	Communicating on social media sites (such as Facebook or Twitter) about your studies	5.31	0.57
c	Participating in interactive class activities (e.g., group discussion, collaborative writing)	4.99	0.10
d	Listening to course audio materials such as lectures or podcasts	4.98	0.36
e	Using video or audio conference tools such as Skype to communicate with fellow students or course leaders	4.65	1.28
f	Taking photos or videos to support your learning	4.65	1.28
g	Accessing or reading course materials/contents (e.g. syllabus, recorded lectures, blogs, supplemental learning materials, e-texts)	4.35	0.52
h	Completing assignments	4.32	0.98
i	Participating in discussion forums	3.99	0.24
j	Share information with other students	3.99	0.85
k	Producing content (e.g., documents, spreadsheets, presentations, videos)	3.79	1.32
l	Accessing information about events, student activities and organisations	3.66	0.48
m	Accessing/using the university Learning Management System (e.g., Blackboard)	3.65	0.97
n	Making tuition/fee payments	3.33	1.25
o	Reading prescribed course textbooks or e-texts	2.99	0.18
p	Take notes	2.99	0.18
q	Accessing library resources	2.66	1.71
r	Watching course videos such as video recordings of lectures	2.37	1.43
s	Checking grades	2.34	0.94
t	Sending and receiving emails (to/from the course leader or other students)	1.99	0.83
u	Searching the Internet for course-related information	1.99	0.82
v	Registering courses	1.33	0.49
	Weighted Mean Score	**79.63**	**17.35**

The breakdown of the academic activities performed on mobile devices by the LIS undergraduates by the university is shown in Tables 4.18a – 4.18b.

Table 4.18a shows that BIU ($\bar{x}$ = 5.40, SD = 0.55) followed by UNN ($\bar{x}$ = 5.38, SD = 0.48) and AAU ($\bar{x}$ = 5.34, SD = 0.47) had the highest mean scores for searching online databases (such as journals or publications) and communicating on social media sites (such as Facebook or Twitter) about studies. On the other hand, Table 4.18b shows that UNICAL ($\bar{x}$ = 1.31, SD = 0.52) and TASUED ($\bar{x}$ = 1.31, SD = 0.50) had the least mean scores for registering courses.

Table 4.18a. Breakdown of Academic Activities performed by the Respondents by Universities using Mobile Devices

	Academic Activities performed using Mobile Devices																					
	A		b		c		d		e		f		g		H		i		j		k	
Universities	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
ATBU	5.33	0.47	5.33	0.47	5.00	0.00	5.00	0.00	4.67	1.26	4.67	1.26	4.33	0.48	4.33	0.95	4.00	0.00	4.00	0.82	3.59	1.41
ABU	5.32	0.55	5.32	0.55	5.00	0.09	4.98	0.32	4.65	1.27	4.65	1.27	4.34	0.51	4.32	0.97	3.99	0.21	3.99	0.84	3.82	1.41
UNICAL	5.27	0.77	5.27	0.76	4.98	0.19	4.92	0.67	4.61	1.35	4.61	1.35	4.38	0.63	4.28	1.07	3.95	0.45	3.95	0.93	4.08	1.16
UI	5.33	0.48	5.33	0.48	5.00	0.00	5.00	0.00	4.67	1.26	4.67	1.26	4.33	0.48	4.33	0.95	4.00	0.00	4.00	0.82	4.44	1.10
UNILORIN	5.33	0.47	5.33	0.47	5.00	0.00	5.00	0.00	4.67	1.25	4.64	1.27	4.34	0.48	4.34	0.95	4.00	0.00	3.98	0.83	3.29	1.17
UNN	5.34	0.48	5.34	0.48	5.00	0.00	5.00	0.00	4.66	1.27	4.70	1.25	4.32	0.47	4.32	0.96	4.00	0.00	4.02	0.82	3.18	1.40
AAU	5.34	0.47	5.34	0.47	5.00	0.00	5.00	0.00	4.68	1.25	4.66	1.25	4.34	0.47	4.34	0.94	4.00	0.00	3.99	0.82	3.57	1.32
IMSU	5.30	0.62	5.30	0.62	4.99	0.13	4.97	0.44	4.63	1.30	4.64	1.29	4.35	0.55	4.30	1.00	3.98	0.30	3.98	0.87	3.87	1.36
KWASU	5.33	0.48	5.33	0.48	5.00	0.00	5.00	0.00	4.67	1.26	4.67	1.26	4.33	0.48	4.33	0.95	4.00	0.00	4.00	0.83	3.73	1.35
TASUED	5.30	0.66	5.30	0.66	4.99	0.15	4.96	0.51	4.64	1.31	4.63	1.32	4.36	0.57	4.31	1.01	3.97	0.34	3.96	0.88	3.96	1.34
UMYU	5.30	0.64	5.30	0.63	4.99	0.14	4.96	0.47	4.65	1.30	4.64	1.31	4.36	0.55	4.31	1.00	3.97	0.32	3.97	0.87	3.62	1.09
AUE	5.32	0.48	5.32	0.48	5.00	0.00	5.00	0.00	4.58	1.30	4.68	1.25	4.32	0.48	4.26	0.99	4.00	0.00	4.05	0.85	4.84	0.50
BIU	5.40	0.55	5.40	0.55	5.00	0.00	5.00	0.00	4.60	1.52	5.00	1.22	4.20	0.45	4.20	1.10	4.00	0.00	4.20	0.84	5.00	0.00
MUA	5.33	0.49	5.33	0.49	5.00	0.00	5.00	0.00	4.67	1.29	4.67	1.29	4.33	0.49	4.33	0.98	4.00	0.00	4.00	0.85	3.80	0.86
Total	**5.31**	**0.57**	**5.31**	**0.57**	**4.99**	**0.10**	**4.98**	**0.36**	**4.65**	**1.28**	**4.65**	**1.28**	**4.35**	**0.52**	**4.32**	**0.98**	**3.99**	**0.24**	**3.99**	**0.85**	**3.79**	**1.32**

Keys

M – Mean SD – Standard Deviation

a. Searching online databases b. Communicating on social media c. Participating in interactive class activities d. Listening to course audio materials e. Using video or audio conference tools such as Skype f. Taking photos or videos to support your learning g. Accessing or reading course materials/contents h. Completing assignments i. Participating in discussion forums j. Share information with other students k. Producing content

Table 4.18b. Breakdown of Academic Activities performed by the Respondents by Universities using Mobile Devices

	Academic Activities performed using Mobile Devices																					
	L		m		n		o		p		q		r		s		t		u		v	
Universities	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
ATBU	3.67	0.47	3.67	0.95	3.33	1.26	3.00	0.00	3.00	0.00	2.67	1.71	2.35	1.41	2.33	0.95	2.00	0.82	2.00	0.82	1.33	0.47
ABU	3.66	0.48	3.66	0.96	3.33	1.25	2.99	0.16	2.99	0.16	2.66	1.71	2.32	1.41	2.33	0.95	1.99	0.83	2.00	0.82	1.33	0.48
UNICAL	3.65	0.50	3.62	1.03	3.33	1.25	2.96	0.33	2.96	0.34	2.63	1.73	2.19	1.39	2.35	0.95	1.96	0.88	1.97	0.85	1.31	0.52
UI	3.67	0.48	3.67	0.95	3.33	1.26	3.00	0.00	3.00	0.00	2.67	1.72	1.98	1.14	2.33	0.95	2.00	0.82	2.00	0.82	1.33	0.48
UNILORIN	3.66	0.48	3.66	0.95	3.31	1.26	3.00	0.00	3.00	0.00	2.71	1.73	2.17	1.30	2.31	0.96	2.02	0.83	2.02	0.83	1.33	0.47
UNN	3.68	0.47	3.68	0.96	3.36	1.26	3.00	0.00	3.00	0.00	2.62	1.70	2.78	1.50	2.36	0.94	1.98	0.82	1.98	0.82	1.34	0.48
AAU	3.66	0.47	3.66	0.94	3.34	1.25	3.00	0.00	3.00	0.00	2.67	1.71	2.24	1.37	2.33	0.95	2.00	0.82	2.00	0.82	1.33	0.47
IMSU	3.66	0.48	3.65	0.98	3.33	1.24	2.98	0.22	2.98	0.22	2.65	1.71	2.49	1.47	2.34	0.94	1.98	0.84	1.99	0.83	1.33	0.50
KWASU	3.67	0.48	3.67	0.95	3.33	1.26	3.00	0.00	3.00	0.00	2.67	1.72	2.73	1.51	2.33	0.95	2.00	0.83	2.00	0.83	1.33	0.48
TASUED	3.65	0.49	3.63	0.99	3.34	1.25	2.98	0.25	2.98	0.26	2.65	1.72	2.33	1.44	2.34	0.95	1.98	0.86	1.99	0.84	1.31	0.50
UMYU	3.65	0.49	3.64	0.98	3.34	1.25	2.98	0.23	2.98	0.24	2.65	1.72	2.27	1.38	2.34	0.95	1.98	0.85	1.99	0.83	1.32	0.50
AUE	3.68	0.48	3.74	0.99	3.32	1.25	3.00	0.00	3.00	0.00	2.63	1.71	2.63	1.26	2.37	0.96	2.00	0.82	2.00	0.82	1.37	0.50
BIU	3.80	0.45	3.80	1.10	3.60	1.34	3.00	0.00	3.00	0.00	2.20	1.64	1.60	1.34	2.60	0.89	1.80	0.84	1.80	0.84	1.40	0.55
MUA	3.67	0.49	3.67	0.98	3.33	1.29	3.00	0.00	3.00	0.00	2.67	1.76	4.73	0.80	2.33	0.98	2.00	0.85	2.00	0.85	1.33	0.49
Total	3.66	0.48	3.65	0.97	3.33	1.25	2.99	0.18	2.99	0.18	2.66	1.71	2.36	1.42	2.34	0.94	1.99	0.83	1.99	0.82	1.33	0.49

Keys

M – Mean SD – Standard Deviation

l. Accessing information about events m. Accessing/using the university Learning Management System n. Making tuition/fee payments

o. Reading prescribed course textbooks or e-texts p. Take notes q. Accessing library resources r. Watching course videos

s. Checking grades t. Sending and receiving emails u. Searching the Internet for course-related information v. Registering courses

Research question 6: What are the online information sources used on mobile devices for academic activities by LIS undergraduates in Nigeria?

The online information sources that the LIS undergraduates used for academic activities are as listed in Table 4.19. The data in Table 4.19 shows that the respondents used mainly the Laptop and the Tablet PC to access academic information from scholarly journals (63.5% and 29.7%), library catalogue (49.9% and 29.7%), databases and encyclopaedias (37.5% and 29.7%), websites (35.0% and 2.5%) and eBooks (25.6% and 57.4%) respectively. However, they do not use the e-book reader or the PDA for any of these activities, and only a few used the Smartphone to access academic information from eBooks (17.0%) and encyclopaedias (7.8%) and the Laptop to access information on dictionaries (4.8%).

Table 4.19. Online Information Sources used on Mobile Devices for Academic Activities by LIS Undergraduates in Nigerian Universities

Online Information Sources	Smartphone		Tablet PC		eBook Reader		PDA		Laptops	
	N	%	N	%	N	%	N	%	N	%
eBooks	212	17.0	717	57.4	-	-	-	-	319	25.6
Scholarly Journals	-	-	371	29.7	-	-	-	-	793	63.5
Library Catalogues	-	-	371	29.7	-	-	-	-	624	49.9
Databases	-	-	371	29.7	-	-	-	-	469	37.5
Encyclopaedias	97	7.8	371	29.7	-	-	-	-	469	37.5
Websites	-	-	31	2.5	-	-	-	-	437	35.0
Dictionaries	-	-	-	-	-	-	-	-	60	4.8

The distribution of the online information sources used on mobile devices for academic activities by the respondents in the various universities is as presented in Table 4.20. The findings in Table 4.20 revealed that e-book (100%) was accessed on all the mobile devices by all the respondents in all the Universities while at least 80% of all the respondents in each of the universities used scholarly journals for academic activities. In the private-owned universities category, all the respondents from AUE used all the online information sources on their mobile devices for academic activities except websites (57.9%) and dictionaries which were not used at all. However, respondents from BIU only used library catalogues (20.0%) in addition to eBooks and scholarly journals. Furthermore, whereas at least 65% of respondents from both state-owned and Federal owned universities used encyclopaedias, not up to 45% used websites, and only minority (not up to 8.5%) used dictionaries on mobile devices for academic activities.

Table 4.20. Distribution of the Online Information Sources used on Mobile Devices for Academic Activities by the Respondents

Universities	n	eBooks		Scholarly Journals		Library Catalogues		Encyclopaedias		Databases		Websites		Dictionaries	
		N	%	N	%	N	0%	N	%	N	%	N	%	N	%
ATBU	**70**	70	100.0	66	94.2	53	75.4	51	72.5	46	65.7	20	29.0	2	2.9
ABU	**331**	331	100.0	309	93.2	264	79.7	249	75.1	242	73.1	120	36.2	15	4.5
UNICAL	**79**	79	100.0	73	92.4	61	77.2	57	72.2	53	67.1	27	34.2	2	2.5
UI	**57**	57	100.0	54	94.7	48	84.2	46	80.7	42	73.7	20	35.1	2	3.5
UNILORIN	**38**	38	100.0	35	91.4	31	82.8	29	75.9	38	100	16	43.1	3	6.9
UNN	**46**	46	100.0	43	94.0	38	82.0	36	78.0	35	76.1	20	44.0	4	8.0
AAU	**156**	156	100.0	144	92.5	121	77.6	113	72.7	107	68.6	53	34.2	6	3.7
IMSU	**134**	134	100.0	124	92.7	106	79.3	99	73.7	112	83.6	55	40.8	8	6.1
KWASU	**47**	47	100.0	44	93.8	38	81.3	36	77.1	31	66	18	37.5	4	8.3
TASUED	**118**	118	100.0	109	92.6	90	76.3	85	71.9	87	73.7	39	33.3	5	4.4
UMYU	**134**	134	100.0	126	93.7	109	81.1	104	77.4	111	82.8	56	42.1	7	5.0
AUE	**19**	19	100.0	19	100.0	19	100.0	19	100	19	100	11	57.9	0	0.0
BIU	**5**	5	100.0	4	80.0	1	20.0	0	0.0	0	0.0	0	0.0	0	0.0
MUA	**15**	15	100.0	14	93.3	15	100.0	14	93.3	10	66.7	10	66.7	2	13.3
Total	**1249**	1249	100.0	1164	93.2	994	79.6	937	75.0	933	74.7	469	37.5	60	4.8

Research question 7: What are the print and electronic library information resources available in the library and the frequency of use by LIS undergraduates in Nigerian universities?

The respondents were first asked to state the frequency and purpose of their use of the library in general to establish the library information resources used by LIS undergraduates. Their responses are presented in Table 4.21.

It is evident from the findings presented in Table 4.21 that all the respondents used the library at different intervals and for different purposes. All the respondents visited the library at least once a week to do their assignment ($\bar{x}$ = 4.47, SD = 0.67), to browse books on the shelves or read newspapers ($\bar{x}$ = 4.23, SD = 0.62) or study alone ($\bar{x}$ = 4.00, SD = 0.82). Moreover, almost half of the respondents did not use facilities in the university libraries like photocopying services, checked out/return books, retrieved specific item (46.6%) or used the library for relaxation/entertainment (46.5%) while 69.8% of the LIS undergraduates did not visit the library to ask question from library staff which had the least mean score ($\bar{x}$ = 1.85, SD = 1.42).

Table 4.21. Frequency and purpose of use of the library by LIS undergraduates in Nigerian Universities

Purpose	Frequency											
	Daily		2-3 times a week		Once a week		Occasionally		Never		Mean	SD
	N	%	N	%	N	%	N	%	N	%		
Do assignment	699	56.0	431	34.5	117	9.4	1	0.1	0	0.0	4.47	0.67
Browse books shelves	415	33.2	706	56.5	129	10.3	0	0.0	0	0.0	4.23	0.62
Read newspaper	410	32.8	698	55.9	120	9.6	21	1.7	0	0.0	4.23	0.62
Study alone	415	33.2	416	33.3	418	33.5	0	0.0	0	0.0	4.00	0.82
Use library computers	124	9.9	124	9.9	418	33.5	292	23.4	291	23.3	2.60	1.23
Study with others	124	9.9	124	9.9	420	33.6	291	23.3	291	23.3	2.60	1.23
Use library WiFi	124	9.9	124	9.9	129	10.3	582	46.6	291	23.3	2.37	1.22
Use special collections	124	9.9	124	9.9	129	10.3	582	46.6	291	23.3	2.37	1.22
Use library copiers, etc.	124	9.9	124	9.9	129	10.3	291	23.3	582	46.6	2.13	1.36
Check out or return books	119	9.5	117	9.4	119	9.5	312	25.0	582	46.6	2.10	1.35
Retrieve specific item	116	9.3	119	9.5	116	9.3	316	25.3	582	46.6	2.09	1.34
Relaxation/Entertainment	119	9.5	119	9.5	115	9.2	316	25.3	581	46.5	2.03	1.35
Ask library staff a question	116	9.3	114	9.1	117	9.4	30	2.4	872	69.8	1.85	1.42
Weighted Mean Score											**37.07**	**14.45**

The library information resources available and used by the LIS undergraduates in Nigerian universities for academic activities were grouped into print and electronic information resources. The responses are as presented in Tables 4.22 and 4.23.

As could be seen in Table 4.22, all the listed print library information resources were available and used by the respondents. All the respondents used journals, projects/thesis/dissertation, reference materials (e.g. encyclopaedia, dictionary) and books. Textbooks were used by only 42.9% of the respondents, while the least used of the print resources were grey literature (19.1%).

Furthermore, Table 4.23 also shows that all the listed electronic library information resources were available and used by the respondents. Almost all (90-100%) of the respondents used all the resources except for eBooks, which were used by 89.2% of the LIS undergraduates.

Table 4.22. Print Library Information Resources Available and Used by LIS Undergraduates in Nigerian Universities

Print Library Information Resources	N	%
Journals	1249	100.0
Projects/Theses/Dissertation	1249	100.0
Reference materials e.g. Encyclopaedia, Dictionary	1249	100.0
Books	1249	100.0
Government documents	1190	95.2
Newspapers, Magazines	1071	85.7
Archival materials	952	76.2
Manuscripts/Special collections	774	62.0
Textbooks	536	42.9
Grey literature	239	19.1

Table 4.23. Electronic Library Information Resources Available and Used by LIS Undergraduates in Nigerian Universities

Electronic Library Information Resources	N	%
e-Textbooks	1249	100.0
e-Newspapers, e-Magazines	1249	100.0
Library computers	1249	100.0
e-Manuscripts/e-Special collections	1248	99.9
e-Grey literature	1246	99.8
e-Reference materials e.g. Encyclopaedia, Dictionary	1242	99.4
e-Government documents	1238	99.1
e-Archival materials	1203	96.3
Library website	1191	95.3
e-Projects/e-Theses/e-Dissertation	1158	92.7
eBooks	1114	89.2

The frequency of use of print library information resources by the respondents is as presented in Table 4.24. Table 4.24 shows that 85.7% of the respondents visited the library at least once in a week to use manuscripts/special collections and newspaper/magazine, 85.6% used archival materials while 66.6% of the respondents made use of books respectively. The table also shows that more than half of the respondents (57.1%) visited the library to use textbooks while 19.1%, 14.3% and 0.0% of the respondents rarely or never visited the library to use grey literature, journals and projects/thesis/dissertation respectively.

Table 4.24. Frequency of Use of Print Library Information Resources by LIS Undergraduates in Nigerian Universities

Library Information Resources (Print)	Daily		2-3 times a week		Once a week		Occasionally		Never		At least once a week	
	N	%	N	%	N	%	N	%	N	%	N	%
Manuscripts/Special collections	475	38	416	33.3	179	14.3	0	0.0	179	14.3	1070	85.7
Newspapers/Magazines	178	14.3	356	28.5	536	42.9	59	4.7	120	9.6	1070	85.7
Archival materials	297	23.8	297	23.8	475	38	0	0.0	180	14.4	1069	85.6
Textbooks	713	57.1	60	4.8	59	4.7	0	0.0	417	33.4	832	66.6
Books	0	0.0	356	28.5	358	28.7	475	38	60	4.8	714	57.2
Government documents	59	4.7	178	14.3	297	23.8	179	14.3	536	42.9	534	42.8
Reference materials e.g. Encyclopaedia, Dictionary	0	0.0	0	0.0	299	23.9	535	42.8	415	33.2	299	23.9
Grey literature	0	0.0	0	0.0	239	19.1	594	47.6	416	33.3	239	19.1
Journals	0	0.0	178	14.3	0	0.0	1071	85.7	0	0.0	178	14.3
Projects/Theses/Dissertation	0	0.0	0	0.0	0	0.0	356	28.5	893	71.5	0	0.0

The pattern of use of print library information materials by the respondents is similar in all the universities, as shown in Table 4.25. Table 4.25 shows that in the private universities category, all the respondents in BIU visited the library at least once a week to use manuscripts/special collections followed by 89.5% respondents from AUE while 87.2% and 87.1% of respondents from KWASU (state universities category) and ABU (federal universities category) also used it respectively. None of the respondents in any of the university categories visited the library to use projects, theses or dissertations while less than 15% of all the respondents in all the university visited the library to use journals.

Table 4.25. Use of Print Library Information Resources by LIS Undergraduates in Nigerian Universities

S/N	Universities	N	MS		NM		AR		T		B		GD		RM		GL		J		PTD	
			N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	ABU	**70**	61	87.1	60	85.7	61	87.1	48	68.6	40	57.1	30	42.9	15	21.4	3	4.3	10	14.4	0	0.0
2	ATBU	**331**	284	85.8	282	85.2	284	85.8	221	66.8	188	56.8	141	42.6	77	23.3	71	21.5	48	14.4	0	0.0
3	UNICAL	**79**	67	84.8	67	84.8	67	84.8	54	68.4	45	57.0	36	45.6	18	22.8	16	20.3	11	13.9	0	0.0
4	UI	**57**	49	86.0	50	87.7	49	86.0	36	63.2	33	57.9	22	38.6	15	26.3	12	21.1	8	14.0	0	0.0
5	UNILORIN	**38**	32	84.2	33	86.8	32	84.2	25	65.8	22	57.9	16	42.1	10	26.3	7	18.4	5	13.7	0	0.0
6	UNN	**46**	39	84.8	40	87.0	39	84.8	29	63.0	28	60.9	17	37.0	14	30.4	9	19.6	6	13.9	0	0.0
7	AAU	**156**	134	85.9	133	85.3	133	85.3	106	67.9	89	57.1	70	44.9	36	23.1	31	19.9	22	14.3	0	0.0
8	IMSU	**134**	115	85.8	116	86.6	116	86.6	88	65.7	76	56.7	57	42.5	32	23.9	25	18.7	20	14.6	0	0.0
9	KWASU	**47**	41	87.2	41	87.2	41	87.2	29	61.7	26	55.3	18	38.3	12	25.5	8	17.0	7	14.7	0	0.0
10	TASUED	**118**	100	84.7	101	85.6	100	84.7	80	67.8	68	57.6	52	44.1	29	24.6	23	19.5	17	14.1	0	0.0
11	UMYU	**134**	114	85.1	114	85.1	114	85.1	90	67.2	78	58.2	57	42.5	33	24.6	26	19.4	19	13.8	0	0.0
12	AUE	**19**	17	89.5	16	84.2	16	84.2	13	68.4	10	52.6	9	47.4	3	15.8	4	21.1	3	15.8	0	0.0
13	BIU	**5**	5	100.0	4	80.0	5	100.0	4	80.0	2	40.0	3	60.0	0	0.0	2	40.0	1	20.0	0	0.0
14	MUA	15	12	80.0	13	86.7	12	80.0	9	60.0	9	60.0	6	40.0	5	33.3	2	13.3	2	13.3	0	0.0
n		**1249**																				

Keys

AR - Archival materials B - Books GD - Government documents GL - Grey literature J – Journals MS - Manuscripts/Special collections NM - Newspapers/Magazines PTD - Projects/Theses/Dissertation RM - Reference materials T - Textbooks

Considering the frequency of use of electronic library information resources by the respondents, the result is as presented in Table 4.26. Table 4.26 shows that most of the respondents rarely used electronic information resources made available by the library. The most frequently used electronic library resources were used by less than 20% of the respondents at least once a week. They were e-archival materials, library website and e-projects/e-theses/e-dissertation and e-manuscripts/e-special collections. The least used electronic library resources were e-reference materials like encyclopaedia, dictionary (1.3%), e-newspaper/e-magazine (4.3%) and e-textbooks (5.4%).

Table 4.26. Frequency of Use of Electronic Library Information Resources by LIS Undergraduates in Nigerian Universities

Electronic Library Information Resources	Daily		2-3 times a week		Once a week		Occasionally		Never		At least once a week	
	N	%	N	%	N	%	N	%	N	%	N	%
e-Archival materials	46	3.7	67	5.4	95	7.6	441	35.3	600	48.0	208	16.7
Library website	58	4.6	61	4.9	90	7.2	7	0.6	1033	82.7	209	16.7
e-Projects/e-Theses/e-Dissertation	91	7.3	77	6.2	33	2.6	16	1.3	1032	82.6	201	16.1
e-Manuscripts/e-Special collections	1	0.1	179	14.3	4	0.3	1056	84.5	9	0.7	184	14.7
eBooks	135	10.8	10	0.8	16	1.3	8	0.6	1080	86.5	161	12.9
e-Grey literature	3	0.2	75	6.0	69	5.5	518	41.5	584	46.8	147	11.8
e-Government documents	11	0.9	32	2.6	58	4.6	177	14.2	971	77.7	101	8.1
e-Textbooks	0	0.0	64	5.1	4	0.3	181	14.5	1000	80.1	68	5.4
e-Newspapers/e-Magazines	0	0.0	4	0.3	50	4.0	676	54.1	519	41.6	54	4.3
e-Reference materials e.g. Encyclopaedia, Dictionary	7	0.6	6	0.5	3	0.2	352	28.2	881	70.5	16	1.3

This pattern is similar in all the university categories, as shown in Table 4.27. Table 4.27 shows that respondents in UNICAL (68.4%), UNILORIN (50.0%, 60.3% and 60.3%) used e-archival materials, library website and e-project/thesis/dissertation respectively in the federal universities category while only respondents in KWASU (37.5%) in the state universities category used the electronic library information resources. None of the respondents in the private universities category used any of the electronic library information resources.

Table 4.27. Use of Electronic Library Information Resources by LIS Undergraduates in Nigerian Universities

S/N	Universities	n	eArch. Material		Lib. Website		eProject/ Thesis/Diss		eManus./ Spec. Coll		eBooks		eGrey Literature		eGov. Documents		eTextbooks		eNewspaper/ Magazines		eRef. Materials	
			N	%	N	%	N	%	N	%	%	%	N		N	%	N	%	N	%	N	%
1	ABU	**70**	0	0.0	0	0.0	0	0.0	9	13.4	0	0.0	0	0.0	0	0.0	25	36.2	30	43.5	0	0.0
2	ATBU	**331**	96	29.1	102	31.0	86	26.0	52	15.8	69	20.9	72	21.8	41	12.4	0	0.0	0	0.0	17	5.1
3	UNICAL	**79**	54	68.4	54	68.4	54	68.4	12	15.2	42	53.2	36	45.6	27	34.2	15	19.0	15	19.0	0	0.0
4	UI	**57**	26	45.6	24	42.1	24	42.1	8	14.0	17	29.8	18	31.6	9	15.8	27	47.4	10	17.5	0	0.0
5	UNILORIN	**38**	19	50.0	23	60.3	23	60.3	6	15.5	20	53.4	12	32.8	15	39.7	2	5.2	1	1.7	0	0.0
6	UNN	**46**	1	2.0	1	2.0	1	2.0	6	14.0	1	2.0	1	2.0	1	2.0	0	0.0	0	0.0	0	0.0
7	AAU	**156**	0	0.0	0	0.0	0	0.0	22	14.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
8	IMSU	**134**	0	0.0	0	0.0	0	0.0	19	14.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
9	KWASU	**47**	18	37.5	18	37.5	18	37.5	7	14.6	14	29.2	12	25.0	9	18.8	5	10.4	5	10.4	0	0.0
10	TASUED	**118**	0	0.0	0	0.0	0	0.0	17	14.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
11	UMYU	**134**	0	0.0	0	0.0	0	0.0	19	14.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
12	AUE	**19**	0	0.0	0	0.0	0	0.0	3	15.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
13	BIU	**5**	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
14	MUA	**15**	0	0.0	0	0.0	0	0.0	2	13.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
n		**1249**																				

Research question 8: What is the relative influence of web-searching behaviour, mobile technology, and library information resources use on the academic performance of LIS undergraduates in Nigerian universities?

The relative contribution of each of the independent variables, web-searching behaviour, mobile technology, and library information resources use to the academic performance of LIS undergraduates in Nigerian universities is presented in Table 4.28. The relative contribution of the three dependent variables to the dependent variable was expressed in beta (β) weights. In hierarchical order of the standardised regression coefficient, the table showed web-searching behaviour ($\beta = 0.106$, $t = 3.604$) as the leading contributor followed by library information resources use ($\beta = 0.105$, $t = 3.455$) while the least was mobile technology use ($\beta = 0.031$, $t = 1.037$). The inference to be drawn from this result is that web-searching behaviour and library information resources use were the most potent factors that predicted the academic performance of LIS undergraduates in Nigeria.

In order to further assess and ascertain the relative contribution of the independent variables to the dependent variable, seven hypotheses were tested at 0.05 level of significance. This are presented in Section 4.4.

Table 4.28. Relative Contributions of the Independent Variables to the Dependent Variable (Test of Significance of the Regression Coefficients)

Model	Unstandardised Coefficients		Standardised Coefficients	T	Sig.
	B	Std. Error	Beta (β)		
(Constant)	3.103	0.087		35.681	0.000
Web-searching Behaviour	0.002	0.001	0.106	3.604	0.000
Mobile Technology Use	0.001	0.001	0.031	1.037	0.300
Library Information Resources Use	0.002	0.001	0.105	3.455	0.001

4.3 Test of the Hypotheses

This section of the research reported the results of the null hypotheses formulated to guide the study. The eight null hypotheses postulated were tested at 0.05 level of significance, and the results are as presented below. Hypotheses 1-6 were tested using the Pearson Product-Moment Correlation Analysis, while hypothesis 7 was tested using Multiple Regression Analysis.

Hypothesis 1: The hypothesis states that: There is no significant relationship between web-searching behaviour and academic performance of LIS undergraduates in Nigerian universities.

The relationship between web-searching behaviour and academic performance of LIS undergraduates in Nigerian universities was established by Pearson Product Moment Correlation. The result is, as presented in Table 4.29.

The report on Table 4.29 shows the correlation coefficient (r) = 0.090, indicating a positive correlation and significant relationship between web-searching behaviour and academic performance. Thus, the study concluded that for LIS undergraduates in Nigeria, there was evidence that web-searching behaviour is related to academic performance. In particular, the more the LIS undergraduates seek and search for information on the web for academic activities, the higher the level of their academic performance ($r = 0.090$, $p<0.05$). Hence, the hypothesis was rejected, which means that there is a significant relationship between web-searching behaviour and academic performance of LIS undergraduates in Nigerian universities.

Table 4.29. Pearson Correlation Table showing the relationship between Web-searching Behaviour and Academic Performance of LIS Undergraduates in Nigerian Universities

Variable	N	$\bar{x}$	SD	df	r	P	Remark
Web-searching Behaviour	1249	131.01	41.090	1246	**0.090**	**.002**	**Significant**
CGPA	1249	3.22	0.767				

Note: N = 1249, P < .05 (2-tailed test)

Hypothesis 2: The hypothesis states that: There is no significant relationship between mobile technology use and academic performance of LIS undergraduates in Nigerian universities.

The relationship between mobile technology use and academic performance of LIS undergraduates in Nigerian universities is as presented in Table 4.30. The correlation analysis reported in Table 4.30 shows that the correlation coefficient (r) = 0.010, indicating that there was no correlation between mobile technology use and academic performance of LIS undergraduates. The table shows a p-value of 0.733 ($p>0.05$), which further demonstrated that there was no significant relationship between mobile technology use and academic performance. Similarly, the study established that for LIS undergraduates in Nigeria, there was no relationship between mobile technology use and academic performance. Hence, the hypothesis was accepted, which means that there is no relationship between mobile technology use and academic performance of LIS undergraduates in Nigerian universities.

Table 4.30. Pearson Correlation Table showing the relationship between Mobile Technology Use and Academic Performance of LIS Undergraduates in Nigerian Universities

Variable	N	$\bar{x}$	SD	df	r	P	Remark
Mobile Technology Uses	1249	93.14	41.799	1246	**0.010**	**.733**	**Not Significant**
CGPA	1249	3.22	0.767				

Note: N = 1249, P > .05 (2-tailed test)

Hypothesis 3: The hypothesis states that: There is no significant relationship between the use of library information resources and academic performance of LIS undergraduates in Nigerian universities.

The relationship between the use of library information resources and academic performance of LIS undergraduates in Nigerian universities is as presented in Table 4.31. The report on Table 4.31 reveals the association between the use of library information resources and academic performance of LIS undergraduates. From the analysis, there was a significant relationship between the use of library information resources and academic performance with $p=0.01$ ($p<0.05$). Moreover, the table also revealed that there was a correlation ($r = -0.074$) between the use of library information resources and academic performance. Therefore, the hypothesis was rejected, which means that there is a significant relationship between the use of library information resources and academic performance of LIS undergraduates in Nigerian universities.

Table 4.31. Pearson Correlation Table showing the relationship between Library Information Resources Use and Academic Performance of LIS Undergraduates in Nigerian Universities

Variable	N	$\bar{x}$	SD	df	R	P	Remark
Library Information Resources Use	1249	110.93	45.914	1246	**-0.074**	**.010**	**Significant**
CGPA	1249	3.22	0.767				

Note: N = 1249, P < .05 (2-tailed test)

Hypothesis 4: The hypothesis states that: There is no significant relationship between the use of library information resources and web-searching behaviour by LIS undergraduates in Nigerian universities.

The relationship between web-searching behaviour and use of library information resources by LIS undergraduates in Nigerian universities is as shown in table 4.32. The correlation analysis, as reported in Table 4.32, shows that there was a significant association between web-searching behaviour and the use of library information resources with $p=0.00$ ($p<0.05$). Moreover, the analysis also revealed a positive correlation with $r = 0.233$. This indicates that the more matured the web-searching behaviours (strategies and processes) exhibited by the LIS undergraduates while searching the web for academic activities, the more they use library information resources. The hypothesis was thus rejected, which means that there is a significant relationship between web-searching behaviour and the use of library information resources by LIS undergraduates in Nigerian universities.

Table 4.32. Pearson Correlation Table showing the relationship between Web-searching Behaviour and Use of Library Information Resources of LIS Undergraduates in Nigerian Universities

Variable	N	$\bar{x}$	SD	df	r	P	Remark
Web-searching Behaviour	1249	131.01	41.092	1246	**0.233**	**.000**	Significant
Library Information Resources Use	1249	110.93	45.914				

Note: N = 1249, P < .05 (2-tailed test)

Hypothesis 5: The hypothesis states that: There is no significant relationship between web-searching behaviour and mobile technology use by LIS undergraduates in Nigerian universities.

The relationship between web-searching behaviour and use of mobile technology by LIS undergraduates in Nigerian universities is as shown in table 4.33. The relationship between web-searching behaviour and mobile technology use by LIS undergraduates in Nigeria is as shown in Table 4.33. The table showed that there was a significant relationship between the two variables ($p = 0.00$). Furthermore, the analysis also revealed a positive correlation between the variables ($r = 0.099$). This means that the more mature the web-searching behaviour of the LIS undergraduates, the more the use of mobile technology for academic activities. Hence, the hypothesis was rejected, which means that there is a significant relationship between web-searching behaviour and mobile technology use by LIS undergraduates in Nigerian universities.

Table 4.33. Pearson Correlation Table showing the relationship between Web-searching Behaviour and Mobile Technology Use of LIS Undergraduates in Nigerian Universities

Variable	N	$\bar{x}$	SD	df	R	P	Remark
Web-searching Behaviour	1249	131.01	41.092	1246	**0.099**	**.000**	**Significant**
Mobile Technology Uses	1249	93.14	41.799				

Note: N = 1249, P > .05 (2-tailed test)

Hypothesis 6: The hypothesis states that: There is no significant relationship between mobile technology use and the use of library information resources accessed online by LIS undergraduates in Nigerian universities.

The correlation between mobile technology use and the use of library information resources accessed online by LIS undergraduates in Nigerian universities for academic activities are as shown in Table 4.34. The correlation analysis, as reported in Table 4.34, indicated a significant relationship between mobile technology use and the use of library information resources accessed online by LIS undergraduates ($p = 0.00$). Furthermore, the analysis also revealed a positive correlation between the variables ($r = 0.266$). This implies that the more the use of mobile technology by the LIS undergraduates for academic activities, the more they use library information resources accessed online. On this premise, the hypothesis was rejected. This means that there is a significant relationship between mobile technology use and the use of library information resources accessed online by LIS undergraduates in Nigerian universities.

The summary of the relationships that exist between each of the independent variables (web-searching behaviour, mobile technology, and library information resources use) and the dependent variable (academic performance) is as presented in Table 4.35.

Table 4.34. Pearson Correlation Table showing the relationship between Mobile Technology Use and Library Information Resources accessed online by LIS Undergraduates in Nigerian Universities

Variable	N	$\bar{x}$	SD	df	R	P	Remark
Mobile Technology Uses	1249	93.14	41.799	1246	**0.266**	**.000**	**Significant**
Library Information Resources Use	1249	110.93	45.914				

Note: N = 1249, P < .05 (2-tailed test)

Table 4.35. Descriptive and Bivariate Correlations showing the Significant Relationships between Web-searching behaviour, Mobile Technology, Library Information Resources Use and Academic Performance

Variables		Mean	SD	1	2	3	4
1	CGPA	3.21	0.767	1.000			
2	Web-searching Behaviour	131.14	42.172	.084	1.000		
3	Mobile Technology Use	93.13	41.589	.014	.112	1.000	
4	Library Information Resources Use	110.91	45.949	.071	.242	.269	1.000

Hypothesis 7: The hypothesis states that: A combination of web-searching behaviour, mobile technology and library information resources use does not significantly predict the academic performance of LIS undergraduates in Nigerian universities.

The combined predictive ability of web-searching behaviour, mobile technology and library information resources use on academic performance was tested using multiple regressions. This result is shown in Table 4.36.

The analysis reported in Table 4.36 revealed that web-searching behaviour, mobile technology, and library information resources use positively correlated and jointly predict academic performance significantly. The results also showed a coefficient of multiple correlations (R) of 0.129 and a multiple R^2 of 0.017. This means that 17% of the variance in academic performance was accounted for by the three predictors taken collectively. The composite contribution significance of the prediction was tested at $p<0.05$ using the F-ratio at the degrees of freedom (df = 3, 1246). The findings showed that the analysis of variance (ANOVA) for the regression yielded an F-ratio of 6.890 (significant at 0.05 level).

These findings imply that there was a significant joint contribution of the independent and dependent variables while that other variables not incorporated in this model may have accounted for the residual variance. Thus, Hypothesis 7 is, therefore rejected. This means that a combination of web-searching behaviour, mobile technology and library information resources use significantly predict the academic performance of LIS undergraduates in Nigerian universities.

Table 4.36. Summary of Regression Analysis the Combined Predictive ability of Web-searching behaviour, Mobile Technology and Library Information Resources Use

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.129[a]	0.017	0.014	0.762

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	11.995	3	3.998	6.890	0.000[a]
	Residual	706.772	1246	0.580		
	Total	718.767	1249			

a. Predictors: (Constant), Web-searching Behaviour, Mobile Technology Use, Library Information Resources Use
b. Dependent variable: Academic performance

4.4 Discussion of the findings

This study investigated how web-searching behaviour, mobile technology, and library information resources use predict the academic performance of LIS undergraduates in Nigeria. This section, therefore, presents the discussion of the findings of the study. The discussions are provided in the sub-sections 4.5.1 to 4.5.16.

Academic performance has received considerable attention as researchers have always been concerned with the exploration of variables that contribute positively or that could promote high academic performance among undergraduates. Universities are established to impart knowledge and skills that could promote high academic performance. This is to produce high-quality human resources which are likely to become national assets. Besides, high academic performance is needed to tackle the technological demands of the future working places for the LIS undergraduates.

Moreover, with increasing use and the inclusion of information and communication technology (ICT) into the curriculum of LIS undergraduates in Nigeria, it is imperative to examine the influence of these factors on the academic performance of LIS undergraduates. Besides, with increasing investment in technology and the paradigm shift in the services provided by libraries and information centres, the onus lies on library schools to produce graduates with high academic performance who are also ICT savvy.

4.5.1 Socio-demographic profile of LIS undergraduates in Nigeria

In order to make a general inference, proportionate samples of LIS undergraduates in Federal, State, and Private Universities in Nigeria were surveyed. The socio-demographic profile of the LIS undergraduates based on the level of the study indicated that those in 300L were not as represented as those in 200L and 400L. This was because, in some of the universities under study, the 300 level LIS undergraduates were on Student Industrial Work Experience Scheme (SIWES) during the period of the constituted questionnaire administration.

Furthermore, the majority of the respondents from all the LIS schools surveyed for this study were within 18 to 24 years age bracket. This was not unexpected, as this indicates that the LIS undergraduates were mostly late adolescents or young adults. This result is in tandem with results from the socio-demographic characteristics of studies involving the academic performance of undergraduates in Nigeria (Tella, Ayeni, and Omoba, 2008; Ebenuwa-okoh, 2010; Olajide, 2017). The gender distribution in this

study also showed an almost equal representation of both genders, an indication that any of the sexes does not dominate the LIS education. This denotes that both male and young female adults have an interest in the LIS profession.

4.5.2 Academic performance of LIS undergraduates in Nigeria based on their Cumulative Grade Point Average

All the universities surveyed under this study except UI and KWASU use the old 5-point grading scale in the Nigerian University System (NUS). While UI uses a 7-point grading system, KWASU has adopted the new 4-point grading scale (KWASU, 2018) in line with the newly approved 4-point grading scale for Nigerian universities by the National Universities Commission (NUC) in order to align the different grading scales of CGPA (NUC, 2015; Lawal, 2018). However, UI recently implemented the new grading scale for the 2016/17 academic session (Kehinde, 2017).

In this study, close to forty percent of the LIS undergraduates in all the universities surveyed fell within high academic performance, close to half were within the medium academic performance while those within the low academic performance were less than twenty percent. Thus, based on the CGPA of more than half of the LIS undergraduates, the level of the academic performance was less than average. This finding is in line with the general belief that the academic performance of undergraduates in Nigeria is low (Onoyase, 2014; Zakariya and Bamidele, 2015; Olusola, Omoregie, Emmanuel and Olushola, 2016 Olufemi, Adediran and Oyediran, 2018.).

Thus, much is desired for the improvement of the quality of the academic performance of LIS undergraduates. LIS undergraduates in Nigerian universities like other undergraduates in countries all over the world are expected to engage in learning, gain skills and acquire a broad general education. They are expected to cultivate knowledge of information demonstration, organisation and architecture, content and collections, information needs and uses, and information technology as well as developed world best practices even while in the university (Rhodes, 2008; IFLA, 2012; University of Michigan, 2014; LRCN, 2017). This finding therefore brought to the fore the need for an enhanced attitude to learning and an improved academic performance of the LIS undergraduates in Nigerian universities if they are to be prepared to meet up with the hassles and prospects of the contemporary labour market (Okedigba, Adedigba, and Okedigba, 2019).

Moreover, considering the academic performance in the individual universities studied, five universities (UNN, UNILORIN, UI, IMSU and AUE) had more LIS undergraduates with high academic performance while eight universities (ABU, UNICAL, AAU, KWASU, TASUED, UMYU, BIU and MUA) had majority of the LIS undergraduates within the medium category. However, ATBU had more LIS undergraduates with low academic performance. See Tables 4.2a, 4.2bi – iii. Thus, there was variation in the academic performance of the LIS undergraduates in the various universities. Some of the factors that could cause these variations could include differences in entry requirement, admission policy, curriculum, learning environment (facilities) and socioeconomic factors among others (UTEP, 2013; Owusu-Acheaw and Larson, 2014; Lepp, Barkley and Karpinski, 2015; Steinmayr, Meißner, Weidinger and Wirthwein, 2017; Orike, 2019; Aciro, Onen, Malinga, Ezati, and Openjuru, 2021).

Hence, each university must have basic entry requirements as this determines the quality of the undergraduates and their academic performance. Studies have also shown that the mode of admission or point of entry determines academic performance (Joe, Kpolovie, Osonwa and Iderima, 2014; Orike, 2019; Aciro et.al, 2021). Furthermore, there is a need to enhance the quality of learning and the learning environment to improve the academic performance of the LIS undergraduates. One of such ways to improve learning is through the introduction of ICT and other appropriate courses using emerging technologies. Consequently, this could help in having undergraduates with sound intellectual minds, who would acquire an essential component of the total educational programme and would eventually deliver effectively and quality library and information services (Ruban and McCoach, 2005; Fenollar, Roman and Cuetas, 2007; LRCN, 2017).

Thus, LIS undergraduates in Nigeria must develop a learning goal orientation as previously stated by Elliot and Church (1997) and Elliot and McGregor (2001), so that undergraduates learning can be extended beyond what is required especially in the application of technology for learning. It is, therefore, a call for the LIS undergraduates to have personal convictions, which according to Bandura's self-efficacy theory (Fenollar *et al.*, 2007), is needed to execute actions required to obtain the desired academic performance.

The policy implication of this result is that for high academic performance, each university must adopt stringent mode of admission. Universities must also endeavour to

improve the content of learning by introducing ICT courses and to fully implement the approved LIS curriculum to improve the academic performance of the undergraduates.

4.5.3 Years of Experience, Frequency and Location of Searching the Web for Academic Activities by LIS Undergraduates in Nigeria

Majority of the respondents in this study had less than six months experience or had never surfed the web for academic activities while those who had used the web for an extended period used it occasionally for academic activities. Besides, the use of the web by these respondents took place both on-campus and off-campus. These results show that the majority of the LIS undergraduates in Nigerian universities do not search the web for academic activities. Remarkably, this substantiates the previous observation of Kirschner, Paul and Karpinski (2010) that undergraduates are capable of playing with technology, but are not necessarily using it efficiently for academic purposes. Cmor and Lippold (2001) had also noted that the web is used for the whole lot by undergraduates, they could devote minutes or hours surfing the web, have a positive attitude towards the Internet and find enjoyment in using the web for academic and personal purposes, but as seen in this study, they spent less time on the web for academic activities. However, the findings showed that LIS undergraduates in AUE in contrast to other universities searched the web daily. This could probably be attributed to the class size (n = 19) and the learning approach within the university.

Promotion and implementation of web-based/online learning in an educational setting made the web an integral part of the lives of undergraduates as the primary source of information (Tsai, 2009). Besides, the hours spent weekly to search for information online increase the web-searching experience of undergraduates (Tsai, Liang, Hou, and Tsai, 2012). Thus, undergraduates are required to continually search for information on the web to perform most of their academic activities like turning in assignments, term papers, projects, as well as personal or social activities.

It is therefore expedient for LIS undergraduates to spend more time on the web for academic purpose as a previous study by Grace-Martins and Gay (2001) has shown that frequency and duration of browsing sessions correlate with positive grades of undergraduates. Furthermore, the web has the potential of enhancing the academic performance of undergraduates effectively because it affords access to wide-ranging information anytime, anywhere. As reported by Bhattacharjee (2014), the web provides facilities that could enhance the academic performance of undergraduates. Thus, LIS

undergraduates will perceive the web as being valuable as a source of information to complete their academic activities and use it more for educational purposes.

The policy implication of this finding is that spending time on the web for academic activities enhances academic performance. Thus, Nigerian higher institutions of learning should promote and implement web-based/online learning for this will encourage the students to spend more time on the web for academic activities.

4.5.4 Search engines, web browsers, online information seeking processes and search strategies used for academic activities by LIS undergraduates in Nigeria

The study shows that search engines mostly used for academic activities by the respondents are Google and Yahoo, while Mozilla, Internet Explorer and Google Chrome were the most frequently used web browsers. This finding is not unexpected as these are the most popular search engines and web browsers in use among the undergraduates (Malik and Mahmood, 2009; Lacović, 2014; Oriogu, Okwilagwe, and Ogbuiyi, 2016; Salehi, Du and Ashman, 2018). Other factors that could have accounted for search engines and web browsers use are experience and prior knowledge of the LIS undergraduates (Kinley, 2014). These search engines and browsers also influenced the web search strategy of the undergraduates and determined the perceived satisfaction level.

These identified search engines and browsers in recent times were the main or only sources of academic information used by undergraduates as they were viewed to be essential learning resources. This finding implies that even if the study respondents used academic information resources like scholarly journals, e-textbooks, OPAC, e-theses or e-dissertations, the initial ideas are derived from a web search (Salehi, Du and Ashman, 2018). Thus, LIS undergraduates may end up with less reliable sources when compared with academic information sources. For this reason, it is paramount to include web search in the education of the LIS undergraduates and also guide them in using search engines designated for educational purposes like Google Scholar and Ask.com.

Furthermore, the chaining process was the most preferred search process by which the LIS undergraduates start their online information seeking process. The differentiating process followed this. Thus, it was an indication that after the LIS undergraduates initiated a search process, they went through search procedures by following hypertextual links back and forth to find related information resources. This was followed by the filtering process, which is reflected in the selection of pages and

sites that are useful through bookmarking, printing, copying and pasting, among others. All these are in line with Ellis' model of information seeking behaviour (Ellis (1989); Ellis, Cox and Hall (1993); Ellis and Haugan (1997); Baro, Onyenania and Osaheni, (2010) and follows the assumption that although it may be without any chronological order, when a user seeks for information on the web, the processes involved are starting, search procedures (chaining, browsing or monitoring), filtering, action performed and ending (Wilson, 1999). In summary, in terms of online information seeking process, the LIS undergraduates' web-searching behaviour could be described by their chaining and differentiating (filtering) activities. That is, the undergraduates mostly follow hypertextual links on the web to related information sources and select the useful page(s) by printing, copying and pasting among others.

Moreover, based on the Online Information Searching Strategies Inventory (OISSI) full version (Tsai and Tsai, 2003; Tsai, 2009), the tool used for the evaluation of self-reflected web-searching strategies of the LIS undergraduates, behavioural domain strategies are the most utilised search strategies followed by the procedural domain strategies. It is also pertinent to note that metacognitive domain strategies are the least used. This is an indication that the LIS undergraduates mostly possessed skills that are needed for basic search, manipulation, navigation and general content searching on the Internet but lack skills that are used for high-order and content-related cognitive actions. This authorises earlier conclusions in the literature that when performing a search for an academic task, undergraduates prefer basic search using known search engines and browsers.

Invariably, for improved academic performance, undergraduates are required to put to use their cognitive skills and general knowledge while searching and seeking for information online due to the dynamic nature of the web (Civilcharran, Hughes and Maharaj 2015). This, therefore, lends support to Tsai and Tsai (2003) submission that undergraduates need to acquire better metacognitive strategies to enable them to retrieve relevant information from the web for their academic activities. Other past findings (Civilcharran, Hughes and Maharaj, 2015; Spezi, 2016) have also shown that undergraduates lack adequate searching skills, strategies, and tactics necessary to locate needed information online. This is evident in this study, as the findings indicated that the undergraduates lacked adequate metacognitive strategies to define the reliability of the information resources retrieved from the web.

Thus, in line with the Tsai and Tsai framework for analysing online Information searching strategies (Tsai and Tsai, 2003; Tsai, 2009; Liang, Hou, and Tsai, 2012), instructors are to guide the undergraduates in the use of the metacognitive strategies. If the LIS undergraduates can adequately utilise the two aspects in the procedural domain, that is, trial and error and problem-solving strategies, it will facilitate their use of the metacognitive domain strategies which are selecting main ideas, purpose thinking and evaluation. These cognitive skills were reported to enhance the academic performance of undergraduates (Kuhlthau 1993; Cmor and Lippold, 2001; Ebersole, 2005; Hoeber 2008; Tsai, 2009; Alharbi, Smith and Mayhew, 2013; Hoque, Hoeber, Strong and Gong, 2013; Civilcharran, Hughes and Maharaj, 2015; Krubu and Zinn, 2018).

Thus, the policy implication of these findings is that LIS undergraduates the lack cognitive skills that were reported to enhance academic performance. There is therefore the need to improve the cognitive skills through special trainings on web searching skills.

4.5.5 Mobile technologies and applications used for academic activities by LIS undergraduates in Nigeria

Mobile technology is a technology platform intended for and used on mobile devices. The outcomes of this study showed that laptop and smartphone were the most frequently used mobile technologies for academic activities by the LIS undergraduates in Nigeria. A significant number of the respondents from each of the universities also used the tablet PC except respondents from MUA, where the percentages of use are less than 40%. These findings substantiate earlier reports by Chen and DeNoyelles, (2013), McGraw-Hill Education and Hanover Research (2015) and Vassilakaki, Moniarou-Papaconstantinou and Garoufallou (2016) which identified the use of laptops, smartphones, and tablets as the most popular mobile technologies used for academic activities among undergraduates.

In this study, most of the LIS undergraduates did not use new mobile devices such as eBook readers and PDA. However, several studies (Conole, de Laat, Darby and Dillon, 2008; Wylie, 2016; Beal, 2015; TechTarget, 2016) have identified the use of laptops and a range of new mobile devices like personal digital assistant (PDA or pocket computer), smartphones, tablet pocket computer (Tablet PC), netbooks, iPads, cell phones, iPods, and eBook readers, for academic purposes. These devices are increasingly becoming the choice tools in the modern educational system. Conversely, these devices were not popular amidst the respondents because these devices are not

readily available in our country or are too costly, and most of the undergraduates may not be able to afford them. Therefore, asking LIS undergraduates in Nigeria to use their personally owned mobile technology for learning which is in line with modern-day education methods that advocate for knowledge creation through self-directed actions may not be ideal in Nigeria at this moment.

Mobile applications (apps) are software apps industrialised, specially for mobile devices. Some of these apps include dictionary.com, Microsoft office mobile, google drive, skype, Coursera, vocabulary builder, Dropbox, among others. In this study, respondents used Skype, Dropbox, dictionary.com, Microsoft office mobile, Google drive and Vocabulary builder mobile applications on their Laptops and Tablet PCs for academic activities while Coursera mobile application was the least used of the mobile applications. It is not surprising that none of the respondents used any of the mobile applications on eBook Reader or PDA since these two mobile technologies were the least used by the respondents for academic activities.

This lends support to previous findings in the literature that the most frequently used mobile apps by LIS undergraduates are Gmail app, PDF viewer, Google play, adobe reader, Facebook and Whatsapp (Sharma and Madhusudhan, 2017; Omolade and Opesade, 2017). Mobile devices have inbuilt Wi-Fi capacity for Internet and web use, and the ability to tap into thousands of mobile educational applications (apps) accessible on the Internet which makes it easy for undergraduates to have access to free/open educational resources. Mobile apps not only engage but are instructive (Lynch, 2015). They provide quick and easy means for undergraduates to check on their academic progress thus keep track of their studies through automated updates (Gowans, 2017),

Albeit, mobile technologies, and applications (generally called apps) continue to play a progressively dynamic role in the academic lives of undergraduates, and their popularity continues to increase as they connect users globally, increase access to information and enable interaction with others. Ozcelik and Acarturk (2011) experimental investigation revealed that mobile technologies provide an opportunity for undergraduates by bringing together online and printed course materials while West (2013) opined that mobile devices make academic activities more engaging. In addition to this, mobile technologies, according to Gowans (2017), “are interactive, so content can be developed in stimulating formats, utilising navigation and techniques familiar from digital platforms, including social media.”

The overall effect of using mobile technologies and educational apps is better than not using at all. Based on Sung, Chang and Liu (2016) examination of the empirical research on mobile devices as educational tools and Lateef, Adebanjo and Ibrahim (2020) conclusion on the students' perception of the ease of use and usefulness of mobile technology for learning, it is therefore proposed that the benefits of utilising mobile technologies and apps for academic activities by LIS undergraduates in Nigeria should be explored. This may entail the development of elaborate instructional designs involving the use of mobile technologies that could be incorporated in the LIS curriculum, which can motivate the undergraduates through a new and innovative way of learning.

The policy implication of these findings is that LIS instructors are to be encouraged to acquire knowledge of the innovative technologies and the process of integrating them into the curriculum with sound assessment strategies and support for academic activities of undergraduates. The quantity of educational institutions developing and delivering mobile information services in education is gradually increasing all over the world. LIS schools in Nigeria should also tap into this.

4.5.6 Academic activities performed by LIS undergraduates in Nigeria using mobile devices

The academic activities performed by the LIS undergraduates in this study on mobile devices are: online database search for journals or publications and communication through social media networks (such as Facebook or Twitter), interactive class activities participation (e.g., discussions by groups, writing collaboratively) and listening to recorded lectures or course materials in audio formats as podcasts. The least performed academic activities by the respondents on mobile devices were searching the Internet for course-related information, sending and receiving emails (to/from the course leader or other students) and registering courses.
These findings are similar to the observation by Seeler and Hahn (2011) which identified checking information (such as news and weather), e-mailing and searching information on social networking websites (Twitter, LinkedIn among others) as the academic activities students engaged in using mobile technologies. The findings also corroborate the findings of Dukić (2015) and Mabera, and Sadiku (2021) that searching and reading relevant information materials for class given assignments, tests, examinations and projects, watching educational videos and communicating with others are some of the

academic activities performed by LIS undergraduates on their mobiles. In terms of perceived effectiveness and efficiency of mobile devices for academic purposes according to Sharma and Madhusudhan (2017), productivity tools such as word processing were used in documents creations which are one of the activities also performed by the LIS undergraduates in this study.

The findings of this study further showed that searching the Internet for course-related information was one of the least performed academic activities by the LIS undergraduates on their mobile devices. Probably, these materials were not made available on the web by their instructors, or the formats are not compatible. Mobile technologies could be utilised to boost the learning activities of undergraduates since they afford the undergraduates the desired flexibility in accessing information.

Consequently, the policy implication of this is that educators and other stakeholders could use this opportunity to design a curriculum that could accommodate the use of these technologies and strategies for assessments in order to make academic activities more engaging as evidence abounds that undergraduates used mobile technologies for educational purposes.

4.5.7 Online information sources used on mobile devices for academic activities by LIS undergraduates in Nigeria

Expansions in ICT and the use of the Internet have led to the explosion of information sources (Adeagbo, 2011; Kim, Sin, and Yoo-Lee, 2014; Dumebi, 2017). These information sources are available in various forms ranging from print to electronic formats that are easily accessible on the web through the Internet using mobile or other technologies. In this study, the respondents mainly used their mobile devices (laptops and tablet PC) to access academic information from scholarly journals, the library catalogue, databases, encyclopaedias, websites, and eBooks. While only a few of the respondents used the smartphone to access academic information from eBooks and encyclopaedias, they did not use eBook reader or PDA for any of these activities. These findings support previous results (Kim, Sin, and Yoo-Lee, 2014; Leeder and Shah, 2016; Dumebi, 2017; Hong and Jo, 2017; Ayim, 2019).

Furthermore, the findings show that eBooks were used on the mobile devices used by the LIS undergraduates. However, the majority of the respondents in each of the universities did not make use of their university library website as an online information source. Online information sources are valuable resources and complement textbooks

and other course materials (Hong and Jo, 2017). Thus, the use of eBooks could help in learning and improve the academic performance of undergraduates since they could be easily accessed at their convenience. As such, LIS undergraduates could be guided in the utilisation of appropriate information sources available online for academic activities thereby improving upon their academic performance. In addition, for active learning, undergraduates ought to understand processes of searching, evaluating and selecting suitable online information sources (Leeder and Shah, 2016).

Thus, the policy implication of this finding is that information literacy instruction is crucial in the education of undergraduates so that they may be fortified with skills to determine integrity, objective and value of online information resources (American Library Association, 2016).

4.5.8 Frequency and purpose of use of library information resources by LIS undergraduates in Nigeria Universities

The findings of this study revealed that all the respondents used the library at different intervals and for diverse reasons, but the primary purpose of their visit was to browse books on the shelves or study alone. All of the respondents visited their university libraries at least once a week to do their assignment, yet, the majority of the LIS undergraduates did not make use of charging services, and reprographic services of their libraries neither did they ask questions for directions from the libraries' staff. These findings corroborate the findings of previous studies (Odeh, 2012; Lacović, 2014; Lee, Paik and Joo, 2012; Lacović, 2014; Olajide and Adio, 2017; Sahabi, Askia, and Unobe, 2020; Olorunfemi, and Ipadeola, 2021) on library information resources use, the frequency of visits and purpose of use of the library.

Furthermore, the findings revealed that most of the LIS undergraduates rarely used the electronic information resources like journals, projects/thesis/dissertation, reference materials such as encyclopaedia and dictionary, books and textbooks made available by the library even though they used their mobile devices in accessing generally available sources of information online (see Section 4.5.7). However, in all the universities, the LIS undergraduates mostly visited the library to use print information resources like manuscripts/special collections, newspaper/magazine, archival materials, books and textbooks but rarely visited the library to use grey literature, journals and projects/thesis/dissertation. This could be because most journals are now available through open access and are easily accessible to the undergraduates

(Owusu-Acheaw and Larson, 2014; Dumebi, 2017). It could also be that the undergraduates do not have access to projects/thesis/dissertation in their university libraries. It is essential also to note that the use of textbooks by the LIS undergraduates in all the universities except BIU is not as high as other library information resources. This is an indication that the undergraduates prefer digested information than seeking information from texts.

Although the LIS undergraduates mostly visited their university libraries to use print library information resources, the outcome of the study showed that the undergraduates preferred electronic information resources to print. This submission is contrary to Yamson, Appiah and Tsegah (2018) findings that most of the undergraduates in their study preferred to use print library resources. On the other hand, the finding of this study is in tandem with the findings of Ayim (2019) and Sahabi, Askia, and Unobe, 2020 who also noted that undergraduates make use of available electronic resources to a great extent. In Madondo, Sithole, and Chisita (2017) opinion, undergraduates continue to rely on electronic resources because they are available to them at no cost. Accessibility to a vast array of information resources, either print or electronic, reliable online sources through the library, awareness of the available electronic resources, assistance from library staff, conducive and enabling environments are some of the reasons that make undergraduates use the library (Strang, 2015; Ayim, 2019; Tukur and Kannan, 2020; Olorunfemi, and Ipadeola, 2021).

The policy implication of this for academic libraries is to ensure a progressive update of the information resources, regular current awareness services and top-notched services provided to all library users. The library must provide easy access to the available electronic resources.

4.5.9 Relative prediction of web-searching behaviour, mobile technology, and library information resources use of academic performance of LIS undergraduates in Nigeria

This study showed that web-searching behaviour was the leading contributor to the prediction of academic performance while library information resources use followed. Mobile technology use contributed the least to the prediction of academic performance. The inference is that web-searching behaviour and library information resources use are the most potent factors that predict the academic performance of LIS undergraduates in Nigeria. This is not unexpected as earlier discussed, web-searching

behaviour reflects the inherent behaviour of each undergraduate (Cmor and Lippold, 2001; Tsai and Tsai, 2003; Ebersole, 2005; Malik and Mahmood, 2009; Tsai, 2009; Lacovic, 2014; Liu, 2015).

Furthermore, this underscored the fact that despite availability and affordability, mobile technology on its own cannot improve academic performance. It is, therefore, necessary to teach and train LIS undergraduates how to search the web efficiently and use library information resources effectively to improve their academic performance (Tsai, 2009; Tsai and Liu, 2005; Tsai, Liang, Hou, and Tsai, 2012; Krubu and Zinn, 2018).

4.5.10 Relationship between web-searching behaviour and academic performance of LIS undergraduates in Nigeria

The results of this study established a positive correlation and a statistically significant relationship between web-searching behaviour and academic performance. The implication of these is that the more the LIS undergraduates sought and searched the web for information while engaged in academic activities, the higher the level of their academic performance. The web has been reported to be a source of rich information and a tool for information retrieval. Thus, proper balancing of the information search strategies and seeking processes by the undergraduates could enhance their academic performance (Ebersole, 2005; Aitken, 2007; Malik and Mahmood, 2009; Bhattacharjee, 2014; Civilcharran, Hughes and Maharaj, 2015).

Moreover, the findings of this study showed that the LIS undergraduates only performed basic search using known web search engines and browsers because they did not possess the skills needed for content related cognitive activities when searching the web for academic activities (Malik and Mahmood, 2009; Lee, Paik and Joo, 2012; Bhattacharjee, 2014; Civilcharran, Hughes and Maharaj, 2015). Thus, if LIS undergraduates could master the online seeking processes and search strategies in the three domains, that is, behavioural, procedural and metacognitive domain search strategies, they could get valuable information from the web which could improve their learning processes and eventually translate to improved academic performance. Furthermore, the productivity of the undergraduates from web-searching could be improved by exposing the LIS undergraduates to different methods of information retrieval like boolean operators, meta-search engines and the ‘invisible web’ at the onset of their academic pursuit (Bhatti, 2014; Civilcharran, Hughes and Maharaj, 2015).

Furthermore, the study shows that the LIS undergraduates did not possess the web-searching strategies, that is, metacognitive search strategies needed to retrieve right content from the web that could improve their learning and enhance their academic performance. Grace-Martins and Gay (2001) and Tsai and Tsai (2003) observed that the contents of the web that students searched significantly correlated to their academic performance. This showed that for undergraduates to gain much from web-searching, they must possess more exceptional ability to search for the right information, which all depends on their web-searching behaviour. For improved efficiency from web-searching, it has been suggested that undergraduates could be guided to use recommended contents and applications that are more specific for their learning (Soloway, Grant, Tinker, Roschelle, Mills, Resnick, Berg, and Eisenberg, 1999).

It has also been suggested that learning could be improved by using course websites (Comunale, Sexton and Voss, 2002; Florenthal, 2018) since this could help the undergraduates in accessing the right information needed for their education. Invariably, such course websites could be developed for LIS undergraduates that will give them frequent access to the syllabus of courses, class notes, and a list of books for reading, among others. This could also serve as a platform for review of examination sheets, discussion forum among the undergraduates and useful information could be passed across by the lecturers.

4.5.11 Relationship between the use of mobile technology and academic performance of LIS undergraduates in Nigeria

The study established that there was no relationship between mobile technology use and academic performance of LIS undergraduates in Nigeria. That is, utilisation of mobile technology by the undergraduates did not have any influence on their academic performance. The finding of this study is in agreement with that of Ezemenaka (2013), who observed that no correlation exists between the use of Internet-enabled phone and academic performance.

Conversely, there has been increased advocacy for the incorporation of mobile technology into the learning environment with the claim that it will improve undergraduates' academic performance (UTEP, 2013). Nevertheless, the finding of this study seems not to be in tandem with the advocacy that increased accessibility to mobile technology could advance learning and eventually translate to improved academic performance. This demonstrates that it is not the accessibility and availability of mobile

technologies but the right use of technology for academic purposes that matter. There are pieces of evidence and consensus that mobile technology use could enhance the academic performance of undergraduates. Still, undergraduates should be appropriately guided to use these devices properly for academic purposes (UTEP, 2013; Lepp, Barkley and Karpinski, 2015). The study at the University of Texas, El Paso has proved that the grades of undergraduates who used an iPad for learning improved by ten per cent (10%) whereas, the grades of those who used the device without supervision dropped considerably (UTEP, 2013). Studies have also identified that unguided use of mobile technology could negatively affect the academic performances of undergraduates (Javid, Malik and Gujjar 2011).

Moreover, according to uses and gratification theory, knowledge can be acquired using mobile technology if there are appropriate motivators (Florenthal, 2018). Accordingly, when mobile technology is adequately integrated into the educational sector, it can impact significantly, facilitates supports and enhances the learning activities of the undergraduates (Leung and Wei, 2000; Voelkel, and Bennett, 2014; Wu, Kang and Yang, 2015; Hiniker, Patel, Kohno and Kientz, 2016). The onus then lies on the commitment of universities administration, faculties, the undergraduates themselves and the society at large to successfully integrate mobile technology into the educational process. Consequently, the use of mobile technology could be integrated into the library school curriculum, and the role of lecturers will be to facilitate and guide undergraduates and other students on how to construct and build knowledge from past experiences and prior knowledge using their mobile technology.

4.5.12 Relationship between the use of library information resources and academic performance of LIS undergraduates in Nigeria

In this study, a significant relationship exists between library information resources use and academic performance. This is an indication that the more the LIS undergraduates use library information resources, the higher the effect this has on their academic performance. This finding supports an earlier study at Georgia State University, United States of America, where it was found that library information resources use positively influenced the academic performance of undergraduates (Kot and Jones, 2015). The observation of Wong and Webb (2001) in their study also complements the credibility of this finding.

Furthermore, the findings show that the LIS undergraduates utilised more of print information resources available in the library, and most of the information resources used were related to their academic activities. Thus, with better understanding, awareness and accessibility of library electronic information resources, library information resources use would have a more significant impact on the academic performance of the undergraduates. Therefore, it is expedient for academic libraries to acquire up-to-date print and electronic information resources that could complement the academic activities of the LIS undergraduates. Academic libraries in Nigeria should also endeavour to created awareness of these information resources and ensure accessibility through the web. This study has confirmed that most of the undergraduates prefer to access information sources using their owned mobile devices. This implies that within and outside the library, undergraduates can use the information and can have information materials delivered to them irrespective of their locations. The professional ways in which these information resources are organised could help undergraduates in accessing and retrieving information needed for their education.

Moreover, the exploration of the relationship between library information resources use and academic performance of undergraduates by Saurina, Kelly, Montenegro, González, Jara, Alarcón and Cano (2014) led to the discovery that using the electronic information resources made available by the library has an impact on undergraduates' education. Shrestha (2008) and Farhadpoor (2018) had earlier noted that undergraduates who regularly use the library understand that the information resources that are obtainable in the library are more reliable, comprehensive and scholarly than what most websites provide. Thus, library information resources use could greatly enrich purposeful learning and improve the academic performance of undergraduates and help academic libraries to fulfil their core mission (Fransen and Nackerud 2013).

However, although undergraduates used the university library, it has been reported that they did not obtain all the information they need. Therefore, university libraries must be well equipped with information resources in various formats to provide current information to undergraduates in a professional way to enhance their academic performance. Thus, improved funding and use of library information resources effectively are crucial to improving the academic performance of undergraduates.

4.5.13 Relationship between web-searching behaviour and library information resources use by LIS undergraduates in Nigeria

This study established a nexus between web-searching behaviour and library information resources use. This points to the fact that the more developed the web-searching behaviour (online information seeking and strategies) demonstrated by the LIS undergraduates while searching the web for academic activities, the more the ability to use library information resources effectively. The implication of this is that for adequate library information resources use, appropriate online information seeking processes and search strategies are needful. However, the basic search strategies used by most of the LIS undergraduates, that is, behavioural and procedural domain search strategies, would not suffice. This indicates the need to teach and guide the undergraduates on the use of search strategies, especially, the metacognitive domain search strategies, which are, evaluation, purposeful thinking and select main ideas, to enhance their ability to use electronic library information resources which will ultimately have an impact on their academic performance (Tsai and Tsai, 2003; Tsai and Liu, 2005; Tsai, 2009; Liang, Hou, and Tsai, 2012).

Studies have shown that undergraduates considered library information resources more credible than the Internet sources (Martin 2008; Lacovic 2014), thereupon, they prefer the quick usage of the virtual library and utilisation of e-resources. The web-searching behaviour of undergraduates that use library information resources also determines the way they search for information (Bhattacharjee, 2014). Therefore, it will be easier for those that have good web-searching behaviour to search out useful information from library resources since it has been reported that most undergraduates have a problem in differentiating between scholarly and non-scholarly information sources. It is also of note that experience in the selection of library information may be constructed through web-searching behaviour (Lee, Paik and Joo, 2012).

4.5.14 Relationship between web-searching behaviour and mobile technology use by LIS undergraduates in Nigeria

Technological innovations like web-searching and mobile technology have brought information to the doorstep of undergraduates, however, how they access the information and what they do with all the available information resources, are issues for concern. The findings in this study show a relationship between the web-searching behaviour of the LIS undergraduates and their use of mobile technology. This means

that the better the web-searching behaviour of the undergraduates, the more they will efficiently and effectively use the mobile applications available through the web and their mobile technologies for academic activities. These further reinforce the earlier submission that availability and accessibility of mobile technology cannot translate to improved academic performance. The fact is that mobile devices use by undergraduates in contemporary times does not make them good users of the information resources which they have at their disposal (West, 2013; Zepke, Leach and Butler, 2014; Spezi, 2016).

Dahlstrom, Brooks, Grajek, and Reeves (2015:p. 6) had earlier stated that "meaningful and intuitive use of technology for academics cannot be assumed, even when technology is widely available or used in other contexts." Therefore, undergraduates may be highly interested in using the widely available technology to augment their knowledge, the actual use of mobile technology by undergraduates for learning will be low, unless efforts are made to improve their web-searching behaviour and appropriate guidance towards mobile applications specially designed for educational uses so as to achieve full potential academically.

Undergraduates are often attracted to the web because it provides information in a variety of formats which are easily accessible primarily through mobile technology use (Kassab and Yuan, 2013; Lui, 2015). They have easy access to pictures, videos, music and text in a multitude of subjects, anywhere, anytime. As a result, there are concerns about how undergraduates search for information on the Internet and how instructors can guide the abilities of undergraduates to utilise effectively searching strategies. For these reasons, research on web-searching behaviour is focusing on how the Internet, social media and mobile technology use are changing the way undergraduates seek information.

4.5.15 Relationship between mobile technology use and use of library information resources accessed online by LIS undergraduates in Nigeria

The study has established that a relationship exists between mobile technology use and online use of library information resources. This suggests that the more the LIS undergraduates utilise mobile technology for academic activities, the more they could access library information resources online. The findings of this study showed that all the LIS undergraduates utilised at least one of the mobile technologies and accessed the library resources and services using their mobile devices without any time constraints or

the need to be bodily present in the library (EDUCAUSE, 2016). Furthermore, observations showed that mobile technology is useful to improve the self-regulative learning ability of the undergraduates (West, 2013, Zepke; Leach and Butler, 2014; Vassilakaki, Moniarou-Papaconstantinou, and Garoufallou, 2016; Omolade and Opesade, 2017). Thus, if the library provides web applications that support learning and that are accessible to the undergraduates, this could enhance their learning and invariably, improve their performance academically.

Furthermore, the findings of this study showed the importance of the development of a subject driven mobile applications since technology-rich activities had been documented to help in sustaining undergraduate commitment and peer teamwork compared to less technologically oriented activities (UTEP, 2013; West, 2013; EDUCAUSE, 2016; Florenthal, 2018). Thus, if academic libraries explore the use of these mobile applications based on the LIS curriculum, mobile technology can increase access to library information resources online.

4.5.16 Joint prediction of web-searching behaviour, mobile technology and library information resources use of academic performance of LIS undergraduates in Nigeria.

The findings of this study show that web-searching behaviour, mobile technology, and library information resources use positively correlated and could jointly predict the academic performance of LIS undergraduates. This implies that web-searching behaviour, mobile technology, and library information resources use will jointly and significantly impact the academic performance of LIS undergraduates in Nigeria.

According to the Walberg educational productivity theory (Walberg, 1981) and McGrew and Evans (2004), the key factors that influence undergraduates' performance academically are characteristics of the undergraduates which include ability, motivation, and age; amount and quality of instruction; and the psychological environment which include classroom climate, home environment, peer group, and exposure to media. If all these variables are combined adequately in the learning equation, undergraduates' performances will be enhanced academically. It is evident that if LIS undergraduates actively use mobile technology with a matured web-searching behaviour and make use of library information resources, it could improve their performance academically (Wilmer, Sherman and Chein, 2017). The inclination to use the available and affordable

mobile technology for academic activities by the LIS undergraduates is essential to achieving improved academic performance (Florenthal, 2018). Moreover, training the undergraduates to improve upon the metacognitive strategies in addition to behavioural and procedural strategies (Siegesmund, 2016; Krubu and Zinn, 2018) and access to library information resources (Wong and Webb, 2011; Cox and Jantti, 2012; Soria *et al.*, 2013; ACRL, 2015; Ishii, Lyons and Carr, 2019) will also jointly increase the academic performance of LIS undergraduates.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents a summary of the key findings of the study. The chapter also highlights the summary of significant findings, contribution to knowledge, limitation of the study, concluding remark, recommendations, and suggested areas for further studies.

5.1 Summary of the findings

Considering the research questions and hypotheses postulated, the summary of the findings are as presented below:

1. Socio-demographic profile of LIS undergraduates in Nigeria shows that a significant proportion was within the age bracket of 18 to 24 years and was in mostly late adolescents or young adults. There is also an almost equal representation of both genders in the population studied.
2. Majority of the LIS undergraduates in all the universities surveyed fell within the medium academic performance based on their Cumulative Grade Point Average (CGPA). Only one university had more undergraduates with low academic performance in all the years of study.
3. Majority of the respondents had less than six months experience or had never searched the web for academic activities while those who had been using the web for an extended period used it occasionally for academic activities. The use of the web by the students took place both on-campus and off-campus.
4. The search engines mostly used for academic activities by the LIS undergraduates in Nigeria included Google and Yahoo, while Google Chrome and Opera were the most frequently used web browsers.
5. Behavioural domain strategies were the most utilised search strategies followed by procedural domain while metacognitive domain strategies were the least used. This is an indication that the LIS undergraduates mostly possessed skills that

were needed for basic search, manipulation, navigation and general content searching on the Internet but lacked skills that were intricate with high-order and content-related cognitive activities.

6. The majority of the respondents used the laptop, the smartphone and the tablet PC for academic activities while the LIS undergraduates rarely used notebooks, iPads, cell phones, iPods, eBook readers, and even PDAs in Nigeria universities. In this study, respondents used Skype, Dropbox, Dictionary.com, Microsoft office mobile, Google drive and Vocabulary builder mobile applications on their laptops and tablet PCs for academic activities while Coursera mobile application was the least used of the mobile applications.
7. The academic activities performed by the LIS undergraduates in this study on mobile devices were online databases search such as journals or publications and communicating on social media sites (such as Facebook or Twitter). The least performed academic activities by the respondents on mobile devices were sending and receiving emails (to/from the course leader or other students) and registering courses. In this study, the respondents mainly used their mobile devices (laptops and tablet PC) to accessed academic information from scholarly journals, the library catalogue, databases and encyclopaedias, websites and eBooks.
8. All the respondents used the library at different intervals and for different purposes. The purpose of their visit was to browse books on the shelves or studied alone, and all of the respondents visited the library at least once a week to do their assignment. However, most of the LIS undergraduates did not make use of charging services and reprographic services provided by the library; neither did they visit the library to ask a question from the library staff. Majority of the LIS undergraduates also made use of print library materials like journals, reference materials (e.g. encyclopaedia, dictionary), newspaper/magazine, books, and textbooks but they rarely used electronic library information resources.
9. There existed a significant positive relationship between web-searching behaviour and academic performance of LIS undergraduates in Nigeria.
10. There was no significant association between the use of mobile technology and the academic performance of LIS undergraduates in Nigeria.

11. There was a significant relationship between the use of library information resources and academic performance of LIS undergraduates in Nigeria.
12. There was a positive relationship between web-searching behaviour and use of library information resources of LIS undergraduates in Nigeria.
13. There was a relationship between web-searching behaviours of the LIS and their use of mobile technology. This means that the more web-searching behaviours of the undergraduates, the more they will efficiently and effectively use their mobile technology for academic activities.
14. The findings established a relationship between mobile technology use and online use of library information sources. This suggests that the more the use of mobile technology by the LIS undergraduates for academic activities, the more the LIS undergraduates could access library information resources online.
15. Web-searching behaviour, mobile technology use, and library information resources use positively correlated and could jointly predict the academic performance of LIS undergraduates in Nigerian universities.
16. The relative contribution of each of the independent variables (web-searching behaviour, mobile technology use and library information resources use) to the dependent variable (academic performance) shows that web-searching behaviour was the leading contributor to the prediction of academic performance while the use of library information resources followed. Mobile technology use was the least contributor to the prediction of academic performance of LIS undergraduates in Nigeria.

5.2 Conclusion

The study investigated how web-searching behaviour, mobile technology and library information resources use could be used to predict the academic performance of library and information science undergraduates in Nigeria. The study found out that the academic performance of LIS undergraduates in Nigerian universities was on the average. The study also identified behavioural domain strategies as the most utilised web-searching behaviour of the LIS undergraduates. The laptop and the smartphone were the most frequently used mobile technologies by the LIS undergraduates while they rarely made use of electronic library information resources.

Furthermore, the study established that web-searching behaviour and use of library information resources independently influenced the academic performance of the

LIS undergraduates but there was no relationship between the use of mobile technology and academic performance. However, there is a relationship between web-searching behaviour, the use of mobile technology and the use of electronic library information resources. Moreover, an appropriate combination of the three independent variables, that is, web-searching behaviour, mobile technology and use of library information resources, was shown to be a predictor of the academic performance of LIS undergraduates in Nigerian universities. Web-searching behaviour was the lead contributor to the prediction. This study thus concluded that good web-searching behaviour coupled with the appropriate use of library information resources could improve academic performance.

5.3 Recommendations

Based on the findings of this study, the followings are the recommendations:

1. The academic performance of LIS undergraduates in Nigerian universities calls for concern. Therefore, there is a need for advocacy from all the stakeholders in the training of the LIS undergraduates to seek for means of improving the learning process in the university to enhance the academic performance and raise quality librarians and information professionals. There is a need for a concerted effort by NUC and LRCN for the inclusion of training on metacognitive search strategies and content-related applications in the curriculum. This will also entail training of the trainers.
2. There is a need to include web search in the curriculum of the undergraduate to guide them in the use of search engines that are designed for educational purposes. This expanded curriculum should emphasise training that could improve the metacognitive strategies in addition to behavioural and procedural strategies of the LIS undergraduates.
3. LIS educators should facilitate the undergraduates to spend more time searching the web for academic purposes by giving them assignments and other activities that could encourage them to use the knowledge of web searching gained in class.
4. LIS instructors are also encouraged to gain knowledge of the innovative technologies and how to integrate them into the curriculum with sound assessment strategies and support for academic activities of undergraduates.

5. There is an urgent need for the inclusion of online search strategies and processes in the curriculum of the LIS undergraduates.
6. With the globalisation of information, it is imperative for university and library administrators to put in place appropriate facilities, most notably in the area of mobile technology and library information resources, as these would immensely increase the value of the university libraries.
7. Universities offering LIS programmes should develop and offer mobile information services to guide the students in the use of these devices. They should also improve learning environments by including applications which will give the students constant access to the notes, chapters, course syllabi, and list of books for reading.
8. Universities offering LIS programmes should start to incorporate mobile technology use into the learning process. The lecturers should be encouraged to facilitate and guide undergraduates on the proper use of this technology by directing them to use recommended contents and applications that are explicitly designed for learning.
9. University libraries should be amply equipped with both electronic and print information resources to provide up-to-date information to undergraduates in a professional way to enhance their performance.
10. Since there is a connection between the use of mobile technology and library information resources use, there is the need for academic libraries in Nigeria to be adequately funded to enable the provision of online information sources to meet up with the expectations of the users.

5.4 Contribution of the study to knowledge

1. The study has provided policymakers with information on how web-searching behaviour, use of mobile technology and library information resources use could improve the academic performance of LIS undergraduates which will guide the adoption of best approaches to the learning process.
2. The study outcomes have justified the provision of technology-rich subject driven mobile applications that could be deployed by library schools and academic libraries for teaching LIS undergraduates. This lend credence to Media richness theory and Uses and gratification theory.

3. The outcome of this study has upheld Ellis' Model of Information Seeking Behaviour as well as the Tsai and Tsai Framework for analysing Online Information Searching Strategies. It has provided baseline information on the web-searching behaviour of LIS undergraduates in Nigerian universities when performing searches for academic activities.
4. The study has contributed to the growing body of knowledge on factors affecting the academic performance of undergraduates by showing that web-searching behaviour and use of library information resources on their own could improve academic performance.
5. This study has proved that the appropriate combination of web-searching behaviour, mobile technology and library information resources use could enhance attitude to learning and eventually lead to the improved academic performance of LIS undergraduates in Nigerian universities. This lends support to Walberg's Theory of Educational Productivity.
6. The outcome of this study has provided current information for all stakeholders in the learning process on the necessity to promote the use of content-related cognitive search skills rather than basic search skills by the LIS undergraduates while searching the web for academic activities because of the dynamic nature of the web.
7. The study has provided information regarding the strengths and weaknesses of LIS undergraduates' web-based learning activities and search strategies, and this could help LIS educators in guiding the undergraduates in developing metacognitive search strategy which is more useful academically.
8. This study has provided insight into the connections between the use of library information resources and academic performance, thus providing evidence-based data for academic libraries. This also supports Media richness theory.
9. The outcomes of this study have provided useful information for the website, search engines and mobile technology platform designers in the development of student-oriented and educational websites, search engines and subject-related mobile applications.

5.5 Limitation of the study

1. The study has only investigated three independent variables (web-searching behaviour, use of mobile technology and library information resources use) that

could enhance the academic performance of undergraduates. Consequently, the study does not account for other factors that could affect the academic performance of undergraduates.

2. Due to the disparity in the CGPA collected from the various universities, the scores ought to have been standardised. Raw scores collected from the university offices were used to classify the CGPA of the LIS undergraduates. Thus, the error of analysis might not be ruled out.
3. The result of the study was based on self-reported instrument, and as such, all the elements cannot be completely free of bias.

5.6 Suggestions for further studies

Arising from the findings of this study, there is a need to look into the following research suggestions to deepen knowledge in this field:

1. An experimental study to confirm the combined effect of web-searching behaviour, use of mobile technology and library information resources use in a guided learning environment.
2. Assessment of content guided and specific purpose use of mobile technology on the academic performance of undergraduates.

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APPENDIX

APPENDIX I

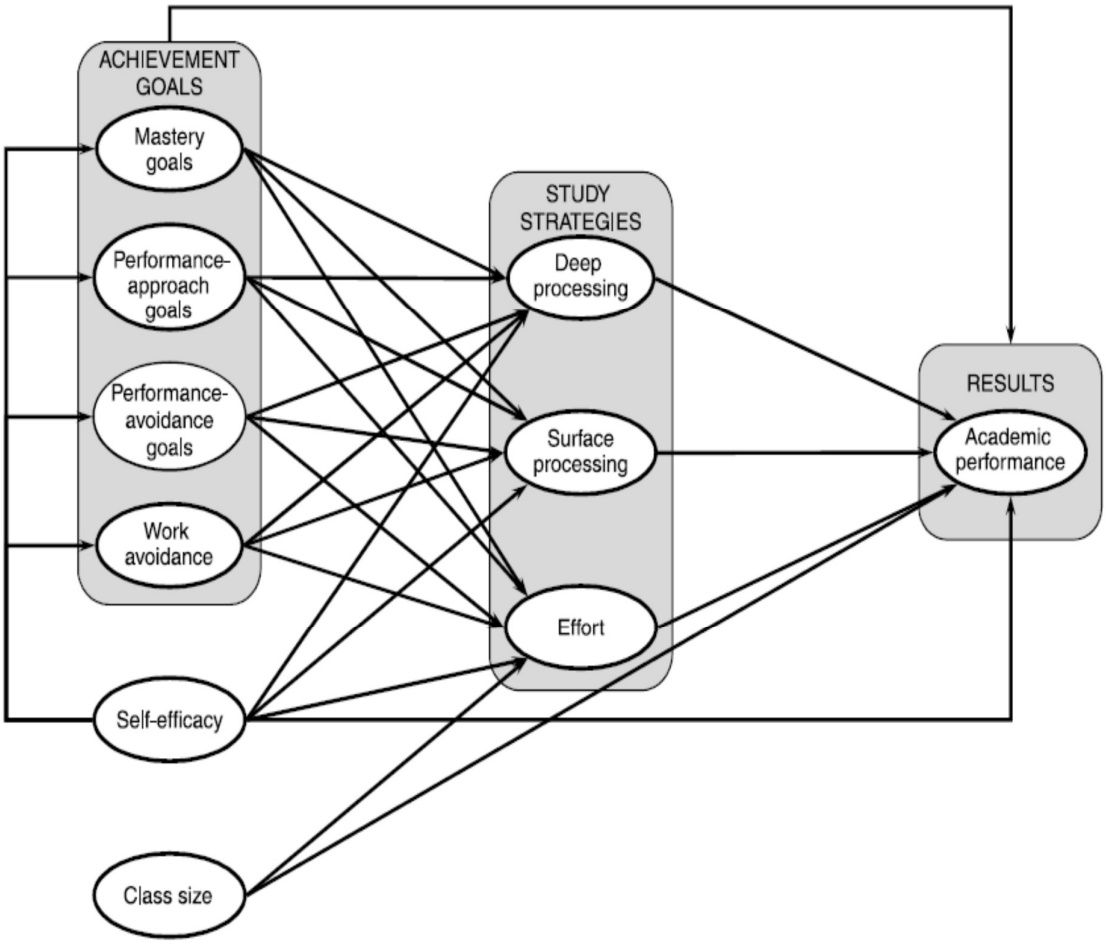


Fig 1: An Integrative Model of the Antecedents of Academic Performance

(*Source: Fenollar, Roman and Cuetas, 2007: p. 875*)

Information Seeking Behaviours	Starting	Chaining	Browsing	Differentiating	Monitoring	Extracting
Literature Search Moves	Identifying sources of interest	Following up references found in given material	Scanning tables of contents or headings	Assessing or restricting information according to their usefulness	Receiving regular reports or summaries from selected sources	Systematically working through a source to identify material of interest
Anticipated Web Moves	Identifying websites/ pages containing or pointing to information of interest	Following links on starting pages to other content-related sites	Scanning top-level pages: lists, headings, site maps	Selecting useful pages and sites by bookmarking, printing, copying and pasting, etc Choosing/starting at differentiated, pre-selected site of known content	Receiving site updates using e.g. push, agents, or profiles Revisiting favourite sites for new information	Systematically searches a local site to extract information of interest at that site

Fig 2: Information Seeking Behaviours and Web Moves

(Source: Choo, Detlor and Turnbull, 1999:p. 452)

Items of the complete version of OISSI.

Item no.	Subscale	Question
25	Disorientation	I do not know what to do when I search information on the Internet[a]
24	Disorientation	I always feel lost while searching information on the Internet[a]
22	Disorientation	I always feel nervous when I search information of the Internet[a]
23	Disorientation	I do not know how to start my online searching[a]
11	Evaluation	I keep on evaluating the relationships among the information searched from the web
10	Evaluation	I think of how to present and organize the data that I have searched from the web
12	Evaluation	I compare information that has been collected from different websites
13	Evaluation	I decide if the information provided in a website is worth for reference
18	Purposeful thinking	I usually make sure the goals before starting my online searching
16	Purposeful thinking	I keep on reminding myself of the purpose for searching online
19	Purposeful thinking	Sometimes, I stop and think about what information is still lack
17	Purposeful thinking	I think of how to utilize the searched information
28	Trial and error	I try other databases when I cannot get any information in one database
27	Trial and error	I try some possible entrance websites when I cannot find enough information
29	Trial and error	I try some other search engines when my search is not successful
6	Select main ideas	I usually think about what keywords I can use in advance
7	Select main ideas	I select main ideas provided in each webpage as possible as I can
8	Select main ideas	I look through titles or hyperlinks in a web in order to catch major information
3	Control	I know how to utilize advanced-search functions provided by search engines
1	Control	I know how to use a web browser, like IE or Netscape
2	Control	I look through the titles or hyperlinks in order to catch the main ideas in a webpage
4	Control	I know how to login a specific website with its URL
30	Problem solving	I usually give up searching when I come up with unsolved problems[a]
33	Problem solving	I do my best to resolve any problem occurred during a searching
31	Problem solving	I think of some resolutions when I am frustrated with searching problems

[a] Items to be scored reversely.

Fig 3. A complete version of the Online Information Searching Strategies Inventory (OISSI)
(Source: Tsai, 2009: p.478)

APPENDIX II

Table 4.7. Search Engines and Web Browsers Used by Respondents in the Universities for Academic Activities

	Search engines											Web browser							
		Google		Yahoo		Ask.com		Bing		Google scholar		Mozilla		Internet Explorer		Google Chrome		Opera	
Universities	**n**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
ATBU	**70**	60	85.7	34	48.6	25	35.7	20	28.6	10	14.3	61	87.1	55	78.6	55	78.6	20	28.6
ABU	**331**	283	85.5	165	49.8	120	36.3	96	29.0	49	14.8	284	85.8	261	78.9	259	78.2	94	28.4
UNICAL	**79**	67	84.8	38	48.1	30	38.0	24	30.4	12	15.2	67	84.8	62	78.5	61	77.2	21	26.6
UI	**57**	49	86.0	29	50.9	20	35.1	16	28.1	8	14.0	49	86.0	45	78.9	45	78.9	16	28.1
UNILORIN	**38**	33	86.8	20	52.6	13	34.2	10	26.3	5	13.2	31	81.6	30	78.9	30	78.9	10	26.3
UNN	**46**	40	87.0	23	50.0	16	34.8	12	26.1	6	13.0	40	87.0	35	76.1	37	80.4	15	32.6
AAU	**156**	133	85.3	77	49.4	58	37.2	47	30.1	23	14.7	134	85.9	123	78.8	121	77.6	43	27.6
IMSU	**134**	115	85.8	68	50.7	46	34.3	37	27.6	19	14.2	115	85.8	106	79.1	106	79.1	39	29.1
KWASU	**47**	41	87.2	25	53.2	15	31.9	12	25.5	6	12.8	40	85.1	37	78.7	38	80.9	15	31.9
TASUED	**118**	102	86.4	60	50.8	40	33.9	31	26.3	16	13.6	101	85.6	92	78.0	94	79.7	35	29.7
UMYU	**134**	115	85.8	65	48.5	49	36.6	39	29.1	19	14.2	115	85.8	104	77.6	105	78.4	39	29.1
AUE	**19**	17	89.5	12	63.2	5	26.3	4	21.1	2	10.5	16	84.2	16	84.2	16	84.2	6	31.6
BIU	**5**	3	60.0	1	20.0	4	80.0	4	80.0	2	40.0	5	100.0	5	100.0	2	40.0	0	0.0
MUA	**15**	13	86.7	8	53.3	5	33.3	4	26.7	2	13.3	12	80.0	12	80.0	12	80.0	4	26.7
	1249	**1071**	85.7	**625**	50.0	**446**	35.6	**356**	28.5	**179**	14.3	**1070**	85.7	**983**	78.6	**981**	78.6	**357**	28.5

Table 4.13. Mobile Technologies Used for Academic Activities by LIS Undergraduates in Nigeria by Universities

S/N	Universities	N	Smartphone					Tablet					eBook					PDA					Laptop				
			D	T	O	OC	N	D	T	O	OC	N	D	T	O	OC	N	D	T	O	OC	N	D	T	O	OC	N
1	ATBU	**70**	58	0	2	3	7	14	0	30	4	21	20	0	17	5	29	15	0	21	6	28	46	0	14	5	6
2	ABU	**331**	266	0	12	19	34	66	0	132	13	119	91	0	62	19	159	62	0	85	24	159	243	0	42	19	28
3	UNICAL	**79**	62	0	3	4	9	19	0	30	2	28	18	0	10	3	48	14	0	17	4	43	59	0	8	4	8
4	UI	**57**	45	0	2	3	7	12	0	22	2	21	16	0	10	3	28	11	0	14	4	27	41	0	7	3	6
5	UNILORIN	**38**	31	0	1	2	4	9	0	14	1	13	12	0	7	2	18	9	0	9	3	17	29	0	4	2	3
6	UNN	**46**	37	0	2	2	5	11	0	20	2	13	14	0	9	3	19	10	0	13	4	19	32	0	6	3	4
7	AAU	**156**	96	34	4	7	15	30	19	54	4	48	45	4	29	6	71	29	4	38	12	73	95	27	14	7	13
8	IMSU	**134**	107	0	5	7	15	31	0	55	4	44	38	0	20	5	71	26	0	32	11	66	101	0	14	7	13
9	KWASU	**47**	40	0	1	3	3	8	0	18	2	19	15	0	9	3	20	9	0	15	4	19	37	0	6	2	2
10	TASUED	**118**	96	0	4	6	12	28	0	44	4	42	40	0	18	6	54	23	0	26	8	61	88	0	12	6	12
11	UMYU	**134**	111	0	4	7	12	27	0	52	5	51	37	0	25	7	65	26	0	36	8	64	100	0	17	7	10
12	AUE	**19**	13	0	1	1	4	5	0	5	0	9	12	0	0	1	6	3	0	1	2	13	13	0	1	1	4
13	BIU	**5**	5	0	0	0	0	2	0	3	0	0	0	0	0	0	5	2	0	3	0	0	5	0	0	0	0
14	MUA	**15**	11	0	1	2	1	1	0	4	0	10	1	0	3	0	11	2	0	3	0	10	15	0	0	0	0
			977	**34**	**44**	**67**	**127**	**264**	**19**	**482**	**45**	**439**	**357**	**4**	**220**	**64**	**604**	**241**	**4**	**313**	**90**	**599**	**904**	**27**	**145**	**65**	**108**
Total		**1249**	**1249**					**1249**					**1249**					**1249**					**1249**				

Keys

D – Daily, T - 2-3times a week, O - Once a week, OC – Occasionally N - Never

APPENDIX III

UNIVERSITY OF IBADAN
FACULTY OF EDUCATION
DEPARTMENT OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES

Dear Respondent,

Questionnaire on Factors Predicting Academic Performance of LIS Undergraduates

I am a doctoral student of the above named institution and I kindly seek your assistance in completing this questionnaire to enable me complete my study. The purpose of the questionnaire is to collect information on some factors that influence the academic performance of undergraduates. All responses will be treated with utmost confidentiality and used for educational purpose only.

Thank you for your cooperation.

Omobolade O. ADEAGBO (Ph.D Student)
Hezekiah Oluwasanmi Library,
Obafemi Awolowo University,
Ile-Ife
08062303814

Instruction

In all the sections, please fill in or tick (√) as appropriate for each item. Academic activities include but are not limited to accessing course materials, lecture attendances, participating in discussion forums, communicating with lecturers or other students, searching for information or preparing for examinations, assignments, seminars, term papers or projects.

Thank you.

Section A: Socio-Demographic Profile and Background Information

1. Name of University: _____

2. Matriculation number: _____

3. Level: (a) 200L ☐ (b) 300L ☐ (c) 400L ☐

4. Gender: (a) Male ☐ (b) Female ☐

5. Age: (a) below 18 ☐ (b) 18-21 ☐ (c) 22-24 ☐ (d) 25 and above ☐

6. What was your last CGPA? _____

7. Which of these statements best describes you about technology?

(Please tick one item)

a.	I have a tendency to wait a long time to attempt to use new technology	
b.	I don't try to use new technology until I see others using it	
c.	I am one of the first people to try new electronic device or technology	

8. For how long have you been using the Web?

(a) < 6months ☐ (b) 1year ☐ (c) 2years ☐ (d) >2years ☐

9. How frequently do you search the web for academic activities?

(a) Daily (Regularly) ☐ (b) 2-3 times a week ☐ (c) Once a week ☐

(d) Occasionally ☐ (e) Never ☐

10. Where do you normally carry out your web search for academic activities?

(a) On campus ☐ (b) off campus ☐ (c) both ☐

(d) Other places (please specify)_____

11. Please select the search engine(s) you often used for academic activities.

(a) Google ☐ (b) Yahoo ☐ (c) Ask.com ☐ (d) Bing ☐ (e) Google scholar ☐

(f) Others (please specify)_____

12. Please select the web browser(s) you often use for academic activities.

(a) Google Chrome ☐ (b) Crazy Browser ☐ (c) Mozilla ☐ (d) Internet explorer ☐

(e) Opera/Opera mini ☐ (f) Others (please specify)_____

Please note that the mobile technology is as listed below:

1. Smartphone e.g. BlackBerry, iPhone, Android and Window phones
2. Tablet PC e.g. iPad, Samsung Tablet, Kindle Fire, etc.
3. eBook Readers e.g. Kindle, Nook, Kobo Touch, etc.
4. Personal Digital Assistants (PDA) e.g. Palm Pilot, Palmtop, etc.
5. Laptop/Notebook/Chromebook/Netbook, etc.

13. Please describe your mobile technology ownership (select as appropriate).

Ownership/ Mobile technology		**Smartphone**	**Tablet PC**	**eBook Readers**	**PDA**	**Laptop**
a.	I own this technology					
b.	I use this technology but do not own					
c.	I don't own or have access to use this technology					
Other technology owned or used (Please specify):						

14. How frequently and for what purpose do you visit the university/departmental library?

Frequency and Purpose of Library Use		**Daily (5)**	**2-3 Times a Week (4)**	**Once a Week (3)**	**Occasionally (2)**	**Never (1)**
a.	Study alone					
b.	Use library computers					
c.	Use library WiFi					
d.	Browse the books on the shelves					
e.	Use special collections					
f.	Study with others					
g.	Use library copiers, scanners, printer					
h.	Retrieve specific item					
i.	Check out or return books					
j.	Ask library staff a question					
k.	Read newspaper					
l.	Do assignment					
m.	Relaxation/Entertainment					
Others (please specify):						

.

Section B: Web-searching Behaviour of LIS Undergraduates

For all of the items in questions 15, please consider and respond using the following options:

6 = Very much like me 5 = Like me 4 = Somewhat like me

15a. When I search for information on the Internet for learning...		**6**	**5**	**4**	**3**	**2**	**1**
i	I can utilise web browsers like Internet explorer, Google chrome and opera.						
ii	To get the most important ideas in a webpage, I ordinarily glance thru the titles or hyperlinks.						
iii	I can use complex-search features furnished by search engines.						
iv	I can log in a specified website using the URL address.						
v	Most often, I think in advance the keywords to use in search.						
vi	As feasible as I can, I select essential ideas furnished on each webpage.						
vii	In order to capture key information on an internet page, I glance through titles or hyperlinks in a web.						
viii	I think ahead on the presentation and categorisation of the data that I have searched from the web.						
ix	I continue assessing the connections among the information searched from the web.						
x	I evaluate information that has been amassed from distinctive websites.						
xi	I determine if the records supplied in a web page is really worth for reference.						
xii	I kept prompting myself of the motive for looking through on the web.						
xiii	I consider how to make use of the searched information.						
xiv	I normally make sure of the objectives before beginning my on-line searching.						
xv	Occasionally, I stop to contemplate what information is inadequate.						
xvi	I generally feel apprehensive when I scan for information on the Internet.						
xvii	I don't have a clue how to start my online searching.						
xviii	I generally feel lost while looking through information on the Internet.						
xix	I don't have a clue of what to do when I scan for information on the Internet.						
xx	I attempt some feasible entrance sites when I cannot discover sufficient information.						
xxi	I strive to search other search engines when my search is not successful.						
xxii	When my search is unsuccessful, I attempt other search engines.						
xxiii	I generally quit my search when I resolve difficulties.						
xxiv	I am resolute in my thinking when I am baffled with search problems.						
xxv	I do all I can in resolving any difficulties I came about in a search.						
15b. When I am seeking for information on the Internet for learning...		**6**	**5**	**4**	**3**	**2**	**1**
xxvi	I examine the whole page by way of searching through tables of contents, lists of titles, challenging headings, names of agencies or persons, abstracts and summaries, and so on.						
xxvii	To extract information of importance from a local site, I methodically search the site.						
xxviii	I bookmark, print, copy and paste to select useful pages and sites.						
xxix	For new information, I revisit preferred websites.						
xxx	I monitor hyperlinks on beginning pages to other related content sites.						
xxxi	I recognise websites/pages comprising or directing to information of interest.						

3 = Somewhat not like me 2 = Not very much like me 1 = Not like me at all

Section C: Mobile Technology Use by LIS Undergraduates

Please use the following options to answer questions 16 – 20.

Smartphone – 1 Tablet PC – 2 eBook Reader – 3 PDA – 4 Laptops – 5

	16. In the context of studying, please select the activities you use your mobile technology for.	**1**	**2**	**3**	**4**	**5**
a	Accessing or reading course materials/contents (e.g. syllabus, recorded lectures, blogs, supplemental learning materials, e-texts)					
b	Retrieving library resources					
c	Checking grades					
d	Registering courses					
e	Making tuition/fee payments					
f	Accessing information about events, student activities and organisations					
g	Listening to course audio materials such as lectures or podcasts					
h	Watching course videos such as video recordings of lectures					
i	Sending and receiving emails (to/from the course leader or other students)					
j	Reading prescribed course textbooks or e-texts					
k	Searching the internet for course related information					
l	Completing assignments					
m	Participating in discussion forums					
n	Searching online databases such as journals or publications					
o	Accessing/using the university Learning Management System (e.g., Blackboard)					
p	Using video or audio conference tools such as Skype to communicate with fellow students or course leaders					
q	Communicating on social media sites (such as Facebook or Twitter) about your studies					
r	Taking photos or videos to support your learning					
s	Take notes					
t	Share information with other students					
u	Participating in interactive class activities (e.g., group discussion, collaborative writing)					
v	Producing content (e.g., documents, spreadsheets, presentations, videos)					
w	None of these					
Others (please specify):						
	17. Where do you use the mobile technology?	**1**	**2**	**3**	**4**	**5**
a	At home					
b	At the University					
c	While travelling as a passenger in a bus or car					
d	In public places (e.g. Banks, Cybercafés, etc.)					
e	While walking on the streets					
Others (please specify):						

	18. In the context of studying, which of the following information sources do you access using your mobile technology?	**1**	**2**	**3**	**4**	**5**
a	Websites					
b	Databases					
c	Encyclopaedias					
d	Library Catalogues					
e	Scholarly Journals					
f	Dictionaries					
g	eBooks					
h	Newspapers					
Others (please specify):						
	19. How frequently do you use your mobile technology specifically to support your studies?	**1**	**2**	**3**	**4**	**5**
a	Daily (Regularly)					
b	2-3 Times a Week					
c	Once A Week					
d	Occasionally					
e	Never					
	20. In the context of studying, which of the following applications do you use on your mobile technology?	**1**	**2**	**3**	**4**	**5**
a	Skype					
b	Dropbox					
c	Dictionary.com					
d	Microsoft office mobile					
e	Google drive					
f	Coursera					
g	Vocabulary builder					
Others (please specify):						

21. To what extent do you agree or disagree with the following statements?

(Strongly Agree – 4, Agree – 3, Disagree – 2, Strongly Disagree – 1)

	Altitude towards using Mobile Technology for Studying	**4**	**3**	**2**	**1**
a	I want to be able to learn anytime, anywhere				
b	I would like to use my mobile technology to support my studying				
c	I would like to use my mobile technology in a formal learning environment				
d	The internet access is too limited to effectively use mobile technology to support my studies				
e	I would not want to use my mobile technology in class or to support my studies. It is for staying in touch with my family and friends				
f	Using mobile devices to support my studies will be too expensive for me				

22. Which of the mobile technology will you prefer to use for studying if resources such as course materials, textbooks and other learning applications were available for them.

Preference for using Mobile Technology		**4**	**3**	**2**	**1**
a	Smartphone e.g. BlackBerry, iPhone, Android and Window phones				
b	Tablet PC e.g. iPad, Samsung Tablet, Kindle Fire, etc.				
c	eBook Readers e.g. Kindle, Nook, Kobo Touch, etc.				
d	Personal Digital Assistants (PDA) e.g. Palm Pilot				
e	Laptop/Notebook/Chromebook				

Section D: Library Information Resources Use (Print) by LIS Undergraduates

Please use the following options to answer question 23.

Daily=5, 2-3 Times a week =4, Once a Week =3, Occasionally =2, Never =1

(i) **Frequency of use of library information resources (print)**						
23. In the context of studying, how frequently do you visit the library to use the following information resources?						
	Print Resources	**5**	**4**	**3**	**2**	**1**
a	Government documents					
b	Journals					
c	Manuscripts/Special collections					
d	Projects/Theses/Dissertation					
e	Library computers					
f	Reference materials e.g. Encyclopaedia, Dictionary					
g	Textbooks					
h	Newspapers, Magazines					
i	Books					
j	Archival materials					
k	Grey literature					
Others (please specify):						

Section E: Library Information Resources Use (Electronic) by LIS Undergraduates

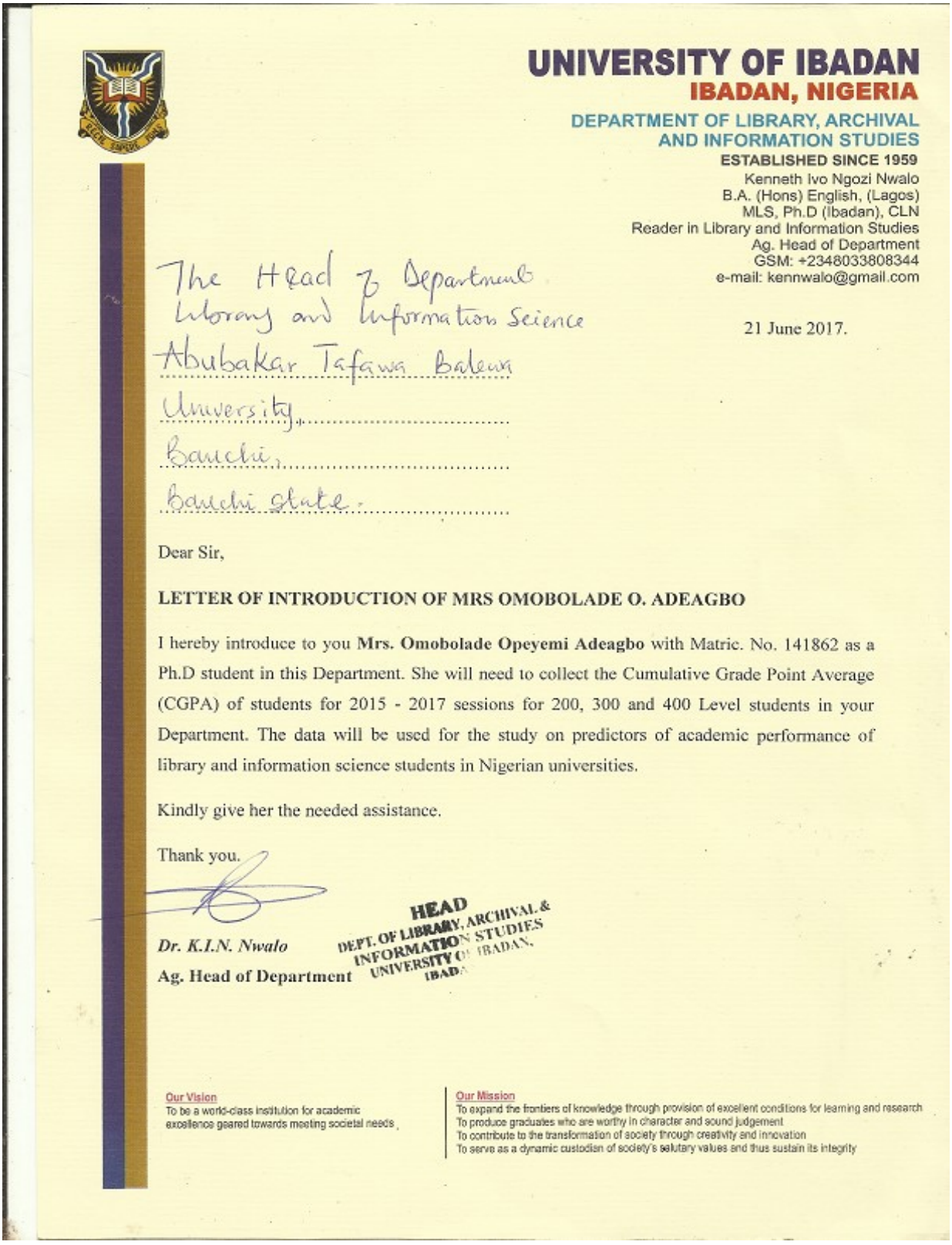
Please use the following options to answer questions 24 – 25.

Daily=5, 2-3 Times a week =4, Once a Week =3, Occasionally =2, Never =1

(i) **Frequency of use of library information resources (electronic)**						
24. In the context of studying, how frequently do you use the following library information resources on your mobile technology?						
	Electronic Resources	**5**	**4**	**3**	**2**	**1**
a	e-Government documents					
b	e-Manuscripts/e-Special collections					
c	e-Projects/e-Theses/e-Dissertation					
d	e-Reference materials e.g. Encyclopaedia, Dictionary					
f	e-Textbooks					
g	e-Newspapers, e-Magazines					
h	e-Books					
i	e-Archival materials					
j	e-Grey literature					
k	Library website					
l	e-library					
m	Library Wi-Fi					
n	OPAC					
o	Licensed Software					
p	Library online guide					
q	e-Journals					
r	Databases					
s	View library hours					
t	Ask a librarian a question through chat					
u	View library contact information					
v	Search library catalogue					
w	Request an item through interlibrary loan					
x	Find out about library events					
y	Renew library items					
z	None of these					
Others (please specify):						
(ii) **Location of use**						
25. In the context of studying, how often do you access online the library information resources from the following locations?		**5**	**4**	**3**	**2**	**1**
a	On campus (Wi-Fi/Internet/Data)					
b	Off campus (Wi-Fi/Internet/Data)					
c	Hostel (Wi-Fi/Internet/Data)					
d	Cybercafé					
e	e-library					
f	Main library					
g	Departmental/Faculty Library					
Others (please specify):						

Thanks for the time taken to complete this questionnaire.

APPENDIX IV



UNIVERSITY OF IBADAN
IBADAN, NIGERIA

DEPARTMENT OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES
ESTABLISHED SINCE 1959

Kenneth Ivo Ngozi Nwalo
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21 June 2017.

The Head of Department
Library and Information Science
Abubakar Tafawa Balewa
University,
Bauchi,
Bauchi State.

Dear Sir,

LETTER OF INTRODUCTION OF MRS OMOBOLADE O. ADEAGBO

I hereby introduce to you **Mrs. Omobolade Opeyemi Adeagbo** with Matric. No. 141862 as a Ph.D student in this Department. She will need to collect the Cumulative Grade Point Average (CGPA) of students for 2015 - 2017 sessions for 200, 300 and 400 Level students in your Department. The data will be used for the study on predictors of academic performance of library and information science students in Nigerian universities.

Kindly give her the needed assistance.

Thank you.

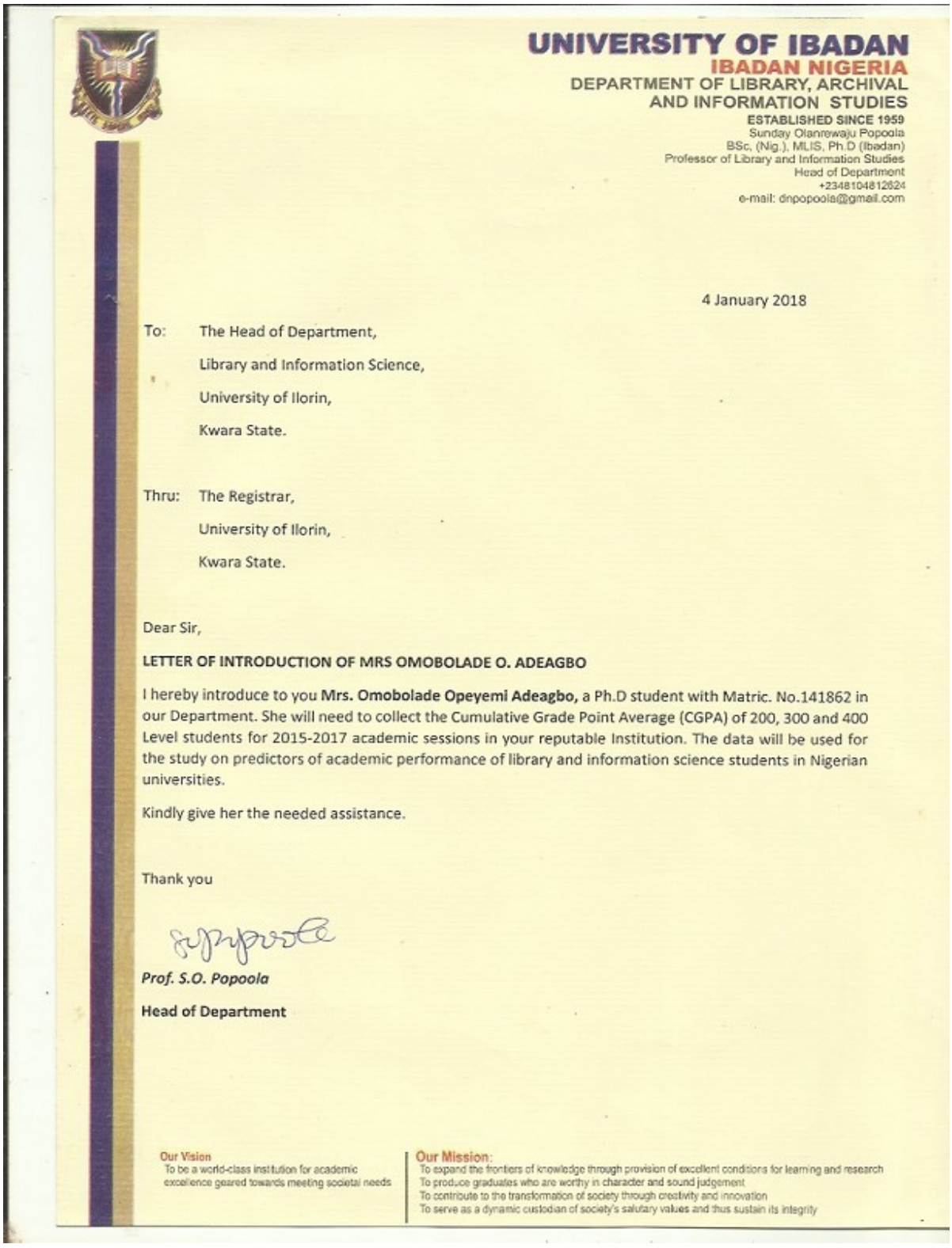
Dr. K.I.N. Nwalo
Ag. Head of Department

HEAD
DEPT. OF LIBRARY, ARCHIVAL & INFORMATION STUDIES
UNIVERSITY OF IBADAN,
IBADAN

Our Vision
To be a world-class institution for academic excellence geared towards meeting societal needs

Our Mission
To expand the frontiers of knowledge through provision of excellent conditions for learning and research
To produce graduates who are worthy in character and sound judgement
To contribute to the transformation of society through creativity and innovation
To serve as a dynamic custodian of society's salutary values and thus sustain its integrity

Fig 4. A Sample of the Introduction Letters



UNIVERSITY OF IBADAN
IBADAN NIGERIA
DEPARTMENT OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES
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Sunday Olanrewaju Popoola
BSc, (Nig.), MLIS, Ph.D (Ibadan)
Professor of Library and Information Studies
Head of Department
+2348104812624
e-mail: dnpopoola@gmail.com

4 January 2018

To: The Head of Department,
Library and Information Science,
University of Ilorin,
Kwara State.

Thru: The Registrar,
University of Ilorin,
Kwara State.

Dear Sir,

LETTER OF INTRODUCTION OF MRS OMOBOLADE O. ADEAGBO

I hereby introduce to you **Mrs. Omobolade Opeyemi Adeagbo,** a Ph.D student with Matric. No.141862 in our Department. She will need to collect the Cumulative Grade Point Average (CGPA) of 200, 300 and 400 Level students for 2015-2017 academic sessions in your reputable Institution. The data will be used for the study on predictors of academic performance of library and information science students in Nigerian universities.

Kindly give her the needed assistance.

Thank you

Prof. S.O. Popoola
Head of Department

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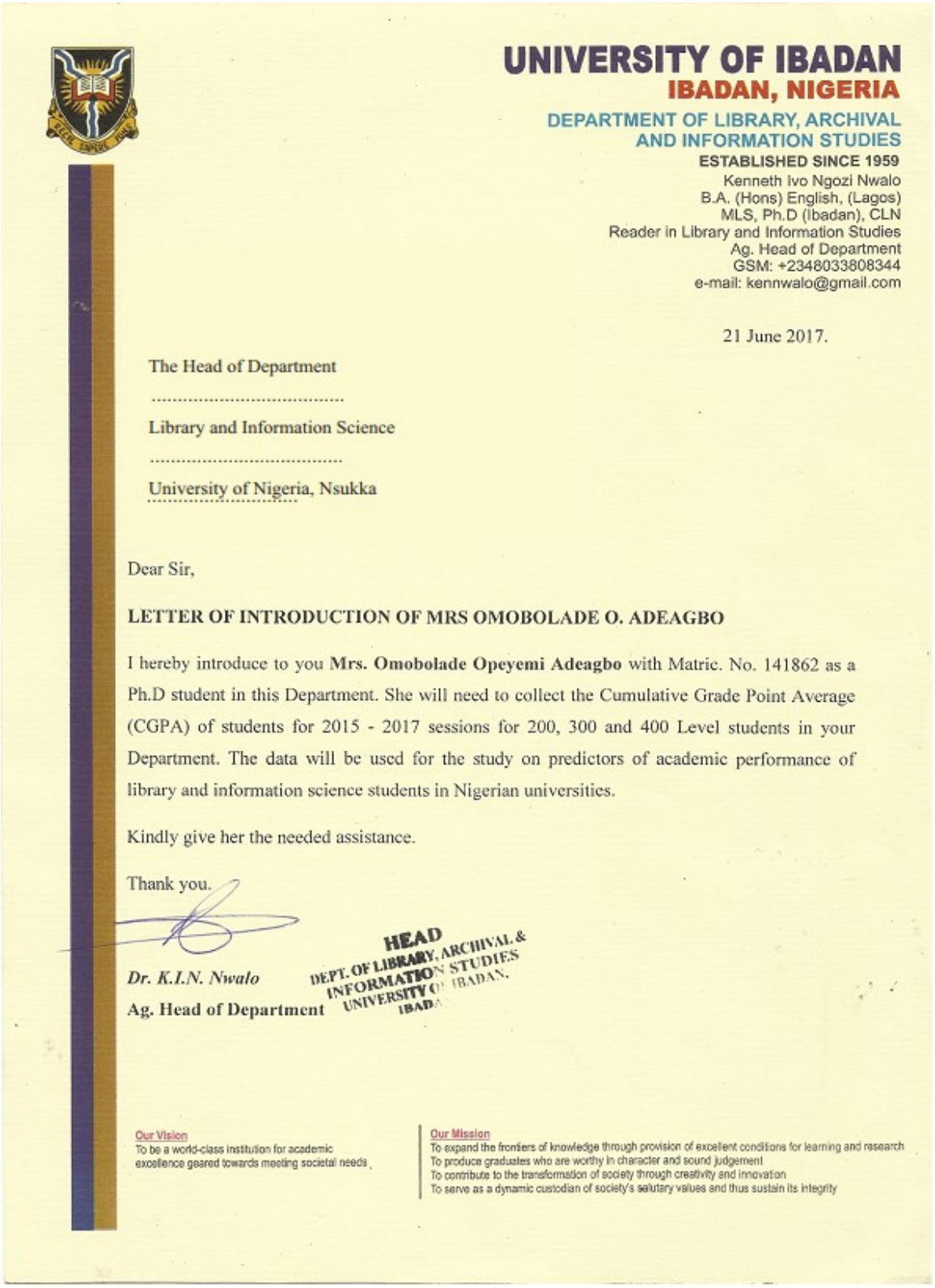
Fig 5. A Sample of the Introduction Letters



UNIVERSITY OF IBADAN
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21 June 2017.

The Head of Department
.....
Library and Information Science
.....
University of Nigeria, Nsukka

Dear Sir,

LETTER OF INTRODUCTION OF MRS OMOBOLADE O. ADEAGBO

I hereby introduce to you **Mrs. Omobolade Opeyemi Adeagbo** with Matric. No. 141862 as a Ph.D student in this Department. She will need to collect the Cumulative Grade Point Average (CGPA) of students for 2015 - 2017 sessions for 200, 300 and 400 Level students in your Department. The data will be used for the study on predictors of academic performance of library and information science students in Nigerian universities.

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Fig 6. A Sample of the Introduction Letters

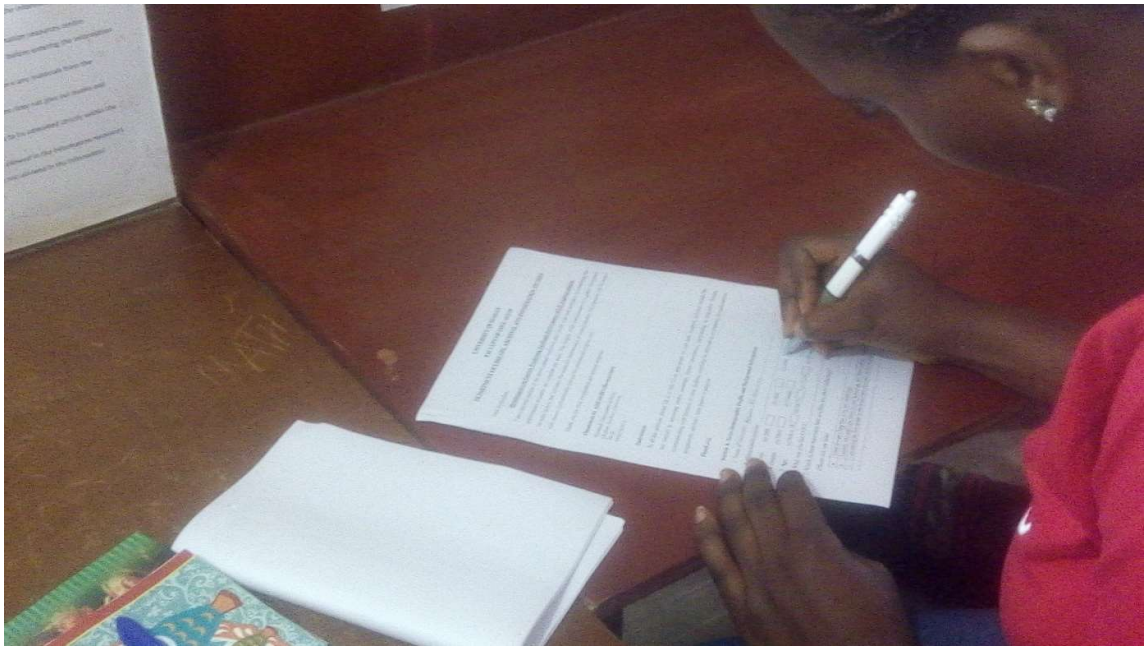

Fig 7a. Picture of the Undergraduates during the administration of the questionnaire

Fig 7b. Picture of the Undergraduates during the administration of the questionnaire

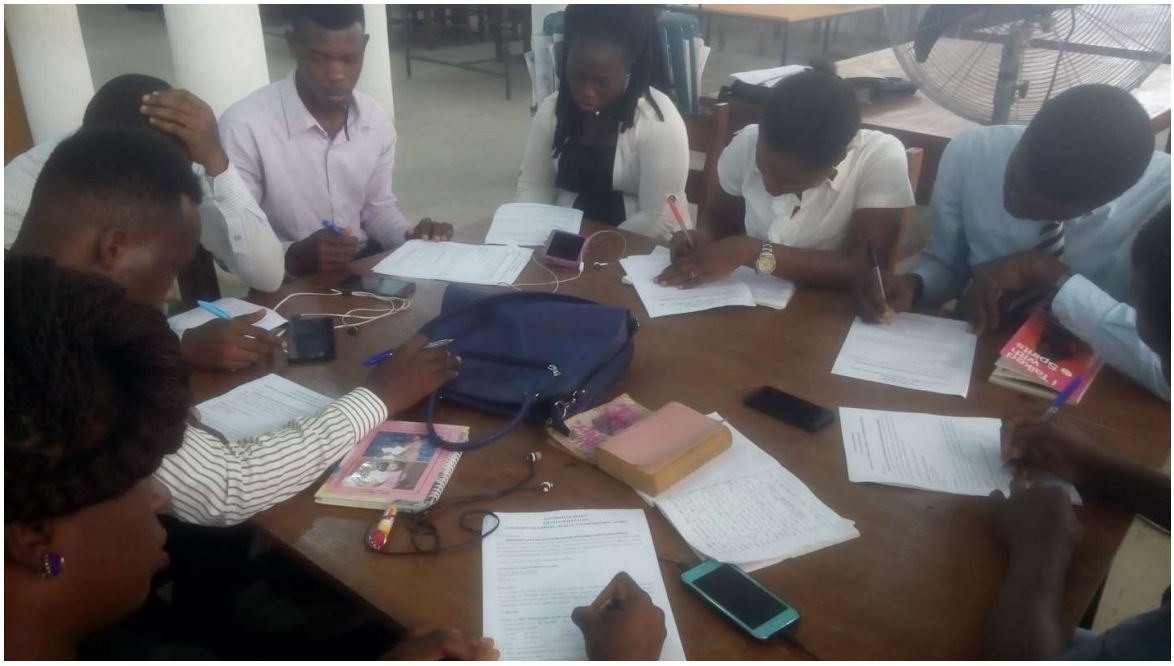

Fig 7c. Picture of the Undergraduates during the administration of the questionnaire

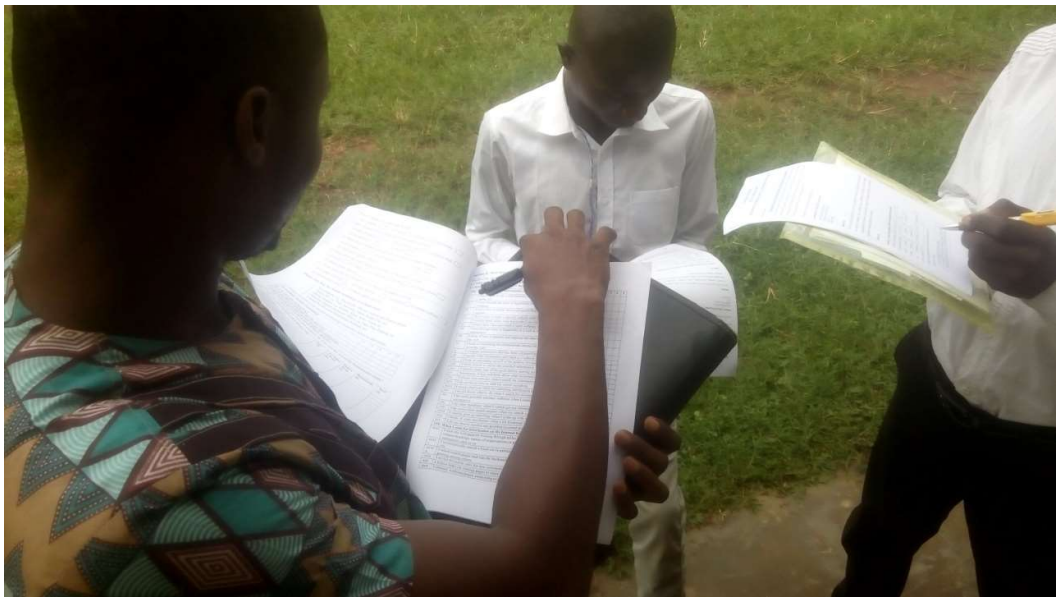

Fig 7d. Picture of the Undergraduates during the administration of the questionnaire

Fig 7e. Picture of the Undergraduates during the administration of the questionnaire

Fig 7f. Picture of the Undergraduates during the administration of the questionnaire