UNIVERSITY OF EDUCATION, WINNEBA

SCIENCE STUDENT TEACHERS' PERCEPTION OF INTERNET USE ON THEIR PERFORMANCE IN SCIENCE AT SOME SELECTED COLLEGES OF EDUCATION IN THE NORTHERN REGION

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DECLARATION

CANDIDATE'S DECLARATION

I, ALI ALHASSAN KARIM, hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Signature: ……

Date: ……

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of the dissertation is supervised in accordance with the guidelines on supervision of thesis laid down by the University of Education, Winneba.

Supervisor's Name: Prof. K. D. Taale

Signature: ……....

Date: ……....

DEDICATION

I dedicate this work to my late mother, Fati Chimsi.

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ABSTRACT

This study was done to find out the science student teachers perception of internet use on their academic performance in science in some selected Colleges of Education in the Northern Region. Three Colleges of Education were purposively selected in the Northern Region to take part in the study. Stratified random sampling technique was used to get participants from the three Colleges of Education to participate in the study. In all, 60 science student teachers were sampled with 20 science student teachers from each College forming the sample. A cross- sectional survey design was used to get the responses from three Colleges of Education in the Northern Region of Ghana. Each of the participants responded to the questionnaire given to them. The questionnaire was administered by the researcher himself to seek the opinions of the science student teachers on the use of internet at the Colleges of Education. The results were then analysed. The results shows that the student teachers perceive internet to be very important to their studies. The results also indicated that the students' use of internet really impacts positively on their performance in science. The study also revealed challenges to the use of internet among students, prominent among them is the lack of skills to search for information. It is therefore, highly recommended that students be given training on how to research for information using the internet.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter is the introductory part of the study. In this chapter the foundation solidly laid for a firm take off. The background to the study where issues concerning internet and how it assists users in sourcing information they require. The background gives a brief description to the problem. The chapter also deals with the statement of the problem. Highlights concerning the problem is necessary for a clear understanding of the problem and also it indicates the direction the research is going. The very important issues regarding the topic are finally laid bare in the statement of the problems. The chapter further looks at the purpose for which this study is conducted; i.e. for who and for what it is conducted. Again, the chapter looks at the research objectives. This clarifies the direction the research went and serves as a channel through which the research must follow. In line with the objectives, the research questions were also crafted to serve as a target to be achieved by the study. Also discussed in this chapter is the significance of the study. The significance looks at what the final outcome of the work would be used for. It also talks about who stand to benefit from the final product. Finally, the chapter looks at delimitations and limitations of the study. It gives a clear idea of why it conducted at the sleeted Colleges but not all the Colleges of Education and also talks about the challenges that were encounter in conducting the research. The the organisation of the study talks about how the whole work is organised. It further gives an idea of what to be expected in each chapter as the work unfolds. Science student teachers are familiar with internet services. However, some of the especially those in level 100 might not be

familiar with its usage. Even those are familiar with it, how they perceive is what this research tried to ascertain.

1.1 Background to the Study

The internet is the collection of millions of computers around the world that are interconnected and serves as a medium that has no limitation of information on each other (Puspita & Rohedi, 2018). Internet is a network of computers that provides various information and communication facilities using standardised protocols. The Internet is a global wide area network that connects computer systems across the world (Christensson, 2015). Internet exemplifies itself in e-mails, web browsing social media, online gaming and software updates (Christensson, 2015).

Web browsing is the use of software applications to locate, retrieve and display content on the World Wide Web. Web browsing offers opportunities for learners to search for information independently through browsers. To be able to browse for information, the computer must be connected to the World Wide Web. This connection links one computer to the over millions of other computers to access information. According to Christensson (2015), one needs to have access to an Internet service provider, which acts as the middleman between the user and the Internet in order to get connected to the Internet. To Christensson, most Internet service providers offer broadband internet access, Wi-Fi signals and even cellular data towers.

Since its emergence, the internet has become an important medium of communication and leisure tool with its benefits being felt in all aspects of life. The internet in no small measure has contributed significantly to access to educational and social information. The use of internet in the educational environment has enabled

easy access to many resources, and information sharing has therefore increased significantly (Sahin, Balta & Ercan, 2010), allowing information seekers to get it in the comfort of their homes or workplaces. Variety of Science concepts can be found online for science student teachers to access. The concepts can be found in the form of text, videos or simulations depending on the form the Science student teacher desires the information, he/ she can get it through the internet.

Researchers have done extensive work on the benefits of internet use, its addiction and accessibility (Sahin et. al, 2010). Acknowledging the easy access, easy downloads and easy copy and paste as some of the convenient ways of using internet, Karim, Zamzuri and Nor (2009) also expressed worry of unethical behaviours users engage in. Some internet users engage in activities that may be unethical and as such making it not serve the purpose for which it was developed. One thing which remains clear is that its judicious use will benefit its users than challenge them. This is because internet is a pool of knowledge and any country that doesn't make internet accessible to its youth is depriving the country of its dignity. In the light of this, many countries and organisations have made efforts to make internet available to its youth to enhance their access to information.

Since their conversion to Diploma awarding institutions in 2005 and subsequently to degree awarding institutions in 2019, Colleges of Education have always strived to train academically sound and professionally oriented student teachers to teach at the basic schools in Ghana. In this light, student teachers are always taken through content courses especially in their first years in College and later prepare them with the pedagogical knowledge to be able to deliver lessons effectively.

Teaching approaches have also moved from lecture method to discovery method. There were times where the teacher only pours out what he knows for learners to digest. Now learners are made to explore and discover things with little or no guidance. One such platform that provides the learner the opportunity to discover things for themselves is the use of internet. With little or no guidance, the learners search for information through the internet. This makes it possible for learners to learn even if the teacher is not physically present in the class.

In this light, Tutors at the Colleges of Education have also started using internet as a way of helping Student Teachers in their learning. With the free Wi-Fi connections in the Colleges of Education, Student Teachers are normally given assignments and Projects to research and present their findings either in groups or individually. This is by way of introducing them to internet and by extension independent learning. The purpose for which internet services are provided is to help student teachers learn to look for information, get access to good materials, and improve their academic achievements. Student teachers are sometimes grouped and topics are given for them to research and present to the whole class later. Student teachers are also made to do their own research and to do assignments on certain topics. Moreover, student teachers under take projects on their own with the guidance of the tutors. In all these, student teachers are encouraged to do their research using the internet since WiFi services are available in the Colleges.

Internet is fairly new to some of the student teachers at the colleges of education, especially the level 100 student teachers. Even though they have encountered it before they are not too clear as to what it can do for them. Some of them are only aware of using it to chat friends on social media whilst others use it to

play games. The student teachers might not know that it is a better alternative to the traditional libraries which has the ability to offer them any information whenever and wherever required.

Recent studies have shown that internet use at the Universities in Ghana have increased and students prefer the use of internet to the use of the traditional libraries (Sahin et. al, 2010). The studies further show that a balance of internet use by University students results in high academic achievement (Sahin et. al, 2010; Karim et. al, 2009). However, studies on the internet use by the student teachers at the Colleges of Education has not been extensively researched into and that is the gap this work seeks to bridge. This study is therefore designed to investigate Science Student Teachers' perception on internet use and their academic achievements at the Colleges of Education in the Northern Region of Ghana.

1.2 Statement of the Problem

The internet has become a very important platform for many activities. It has gained prominence in the security sector, the business community as well as the educational sector. The use of internet in the educational sector has by far increased over the past decades. Different levels of the educational sector use the internet today as an information resource.

Many student teachers in many Colleges of Education are using the internet in varying forms including; games, chatting and seeking information. The easy access to information, the availability of variety of information, the fact that information can be accessed at any place makes the internet a preferential platform for student teachers at the Colleges of Education. Because of the prominence internet has gained recently, student teachers in the Colleges of Education now rely on it for information on their

studies than the traditional libraries. This has made the student teachers see the internet as a better alternative to the traditional libraries making the use of internet increase significantly by student teachers.

According to Aderanti and Adedotun, (2015) students' academic performance is positively impacted by the internet use worldwide and student teachers at the Colleges of Education are no exception when they have access to the internet equally for academic, social and recreational purposes. In his work, Olatokun (2008) found that the internet use increases the academic performance of the students. However, Olatokun (2008) shows that internet can have adverse effects on the academic performance of students because they use it for leisure rather than educational purposes. However, there are barely studies done regarding the internet impact on academic performance of the student teachers in the selected Colleges of Education in the Northern Region of Ghana. Therefore, behind those diverse dissenting views on the impact of the internet on academic performance, it is important to study if these controversies stand true for student teachers in the Colleges of Education in Ghana.

There is a growing trend of internet use in many sectors of our lives. In the area of security, communication, business, and education. Hence, many users of the internet use it for diverse reasons. As some use it for games others use it to chat friends on social media. Others also see it a very convenient place where information regarding their studies can be obtained. The important role internet plays today in the lives of students cannot be overemphasised. To get to understand exactly how science student teacher perceive the internet to be, the researcher designed this researcher to look at the science student teachers perception of internet use on their performance science in some selected Colleges of Education in Northern Region of Ghana.

1.3 Purpose of the Research

This research is designed to examine science student teachers' perception of internet use in the Colleges of Education in the Northern Region of Ghana. This solicited their views about the use of internet. It was to ascertain whether student teacher use the internet for their studies. It would further examine how science student teachers perceive internet to be. The research also looked at the possible challenges the science student teachers face in using the internet at the Colleges of Education in the Northern Region of Ghana.

1.4 Research Objectives

The research was modelled on research objectives, which specifically intends to:

1. explore the ways science student teachers get of internet in the Colleges of Education in the Northern Region of Ghana.
2. examine the internet tools science student teachers' use to obtain information for their studies in the Colleges of Education in the Northern Region.
3. examine the advantage the use of internet has on the performance of science student teachers in science in the Colleges of Education in the Northern Region.
4. examine the likely challenges science student teachers' face in using internet in the Colleges of Education in the Northern Region.

1.5 Research Questions

The following research questions guided the study.

1. How do Science Student Teachers get internet in the Colleges of Education in the Northern Region for their academic purposes?
2. Which internet tools do Science Student Teachers use for information for their studies in the Colleges of Education in the Northern Region?
3. What are the advantages of Science Student Teachers' use of internet has on their performance in science in the Colleges of Education in the northern region?
4. What challenges do Science Student Teachers face in using internet in the Colleges of Education in the Northern Region?

1.6 Significance of the research

The study was undertaken with the aim of determining the impact internet use would have on Science Student Teachers' performance in science. The work sought to contribute significantly to existing knowledge and help Tutors in the Colleges of Education improve their practice in that field. The work therefore examined the most appropriate tools and ways necessary for Science Student Teachers use for academic purposes.

The work could also serve as source document that can inform policy decisions in the educational sector. Policy makers could therefore know how to design the curriculum in line with growing trends in education. It could also help Policy Makers and other stakeholders in education to design awareness programmes needs to be organised for College Tutors and Student Teachers. It could further serve as a

guide to other researchers who may want to research into that area and finally be a good resource material to other teachers in the sciences.

1.7 Delimitations

This research was delimited advertently taking cognisance of certain factors. These factors were envisaged guiding the limit and focus of the work.

Three Colleges were sampled from the Northern Region of Ghana. These Colleges were the Colleges that offer Science as an elective. They were therefore chosen a representative sample of all Colleges offering science as an elective in Ghana. The study was restricted to the three selected Colleges of Education in the Northern Region. The level 100 student teachers were chosen because there were still to progress to other levels. The effective of the study could therefore be guaranteed. It was therefore done purposely to ensure quality and validity of the work.

The study was also delimited to Science Student teachers' use of internet and how it impacts their learning of science in the Colleges of education in the Northern region. There are several topics of interest in Science that could have been researched to add Knowledge and also improve practice.

1.8 Limitations

This work like other research works was envisaged to face restrictions which were likely to challenge the validity of the study. These challenges were envisaged and surmounted to minimise their occurrence.

One particular challenges the researcher faced was participants' objectivity in responding to the questionnaire. Some of the participants were not objective enough and truthful in responding to questionnaire that were given to them to respond to. This

therefore did not make the researcher get the true reflection of how the responders felt.

Another challenge the researcher faced was the cost and risk of travelling from one College to another to administered and retrieve questionnaire from responders. It was quit risky and costly to travel to the other Colleges for the data collection.

1.9 Organisation of the Study

The research is organised in five chapters. Chapter one deals with the introduction to the research. In this chapter, the background to the study where extensive work is done highlighting the problem under study and the gap that the work tries to close. The statement of the problem is also done indicating exactly what the research seeks to do. The purpose of the study, objectives of the study, research questions, significance of the study, delimitations and limitations of the study are also discussed under this chapter.

Chapter two looks at literature related to the work. In this chapter scholarly works of others are reviewed to give a firm grounding to what is being done.

Chapter three also looks at the methodology of the research. The chapter focuses on the research design, population and sampling procedures, research instruments, data collection procedures and data analysis plan.

Chapter four focuses on the data that has been collected from the participants. The data is presentation. The chapter also deals with the analysis of the data collected.

Finally, chapter five concludes the work with summary of the whole work based on the findings, the conclusions drawn from the results, recommendations and suggestions for further studies.

1.10 Definition of terms

Student teachers: Students admitted to the College of Education

Science Student Teachers: students admitted to pursue science education

College 1: the first of the three selected Colleges

College 2: the second of the three selected Colleges

College 3: the third of the three selected Colleges

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Overview

This chapter thus looks at the scholarly works of other researches conducted in this area and has connection to this work. Science student teachers have dissenting views internet use. To successfully carry out this research, the researcher needs to an idea of what people have done in that area. There is therefore the need for previous works on the field to be reviewed to lend credence to this work. The literature is systematically reviewed under the following sub-headings:

1. History of internet
2. Concept of internet
3. Importance of internet
4. Types of internet resources
5. Time spent on the internet
6. Effective use of internet for academic work
7. Effect of students' internet use on their performance in science
8. Challenges on the use of internet for academic purposes
9. Conceptual framework
10. Theoretical framework

2.1 History of internet

The roots of the internet go back a long way mostly to the post- World War II era (Naughton, 2016) with some holding the view that the history of internet started in the United States in the early 1960s (Raphael, 2011). Raphael (2011) believes that internet originated as far back as 1969 as a primitive link-up of 4 computers located at Los Angeles and Santa Barbara of the University of California, the Stanford Research

Institutes and the University of Utah. The purpose for creation of internet was mainly for communication most especially in the security sector of the military. According to Naughton (2016), internet was developed from a military experiment to a civilian utility, and the commercialization of the networks. The history and reason for its development date back to the days the United States and the Soviet Union were competing in expanding their influences in the world, viewing each other with great caution and suspicion (Raphael, 2011). In the late 1950's the Advanced Research Projects Agency (ARPA) was founded in the United States with the primary focus of developing information technologies that could survive a nuclear attack. In 1967 ARPA University and private sector contractors met with representatives of the Department of Defence to discuss possible protocols for sharing information via computers. In 1969, according to Raphael (2011), the U.S. Defence Department funded a project to develop a network, which can withstand the bombing. Basically the idea was to develop a very secure network which can work even after a nuclear attack. This project was known as ARPANET. The proposed network was not supposed to have a central control which would be an obvious target. It connected four sites at the University of California at Los Angeles, the University of California at Santa Barbara, Stanford Research Institute, and the University of Utah. Throughout the 1970's researchers concentrated on developing protocols for controlling networks, moving messages across a system of networks, and allowing for remote access to the networks. Raphael narrates that there were computers connected at about two dozen sites when the first email was sent in 1972, but the number of sites and messages soon mushroomed. By 1975 there were 63 sites. According to him, ten years of research brought Local Area Ethernet Networks (LANs) and workstations were developed to get connected to LAN. These workstations and LANs were then connected to the

ARPANET. For next decade the ARPANET grew and its decentralized features helped its rapid expansion. Computers connected to ARPANET used a standard or rule to communicate with each other. This standard used by ARPANET is known as NCP (National Control Protocol). Protocol is a network term used to indicate the standard used by a network for communication. But the passing time and rapid change in information technology suppressed NCP and brought TCP/IP (Transmission Control Protocol/Internet Protocol) in to the world of networking. TCP "converts messages into streams of packets at the source, and they are reassembled back into messages at the destination. IP handles the dispatch of these packets. It handles the addressing, and makes sure that a packet reaches its destination through multiple nodes and even across multiple networks with multiple standards. This flexibility of TCP/IP to handle multiple networks with multiple protocols encourages other networks to get connected to ARPANET. Slowly the ARPANET became a massive network of networks and now it is known as 'Internet' (Raphael, 2011). The Internet has made significant waves in the computer and communications world like nothing before. The emerging of the telegraph, telephone, radio, and computer set the stage for this unprecedented integration of capabilities. The Internet is at once a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographic location. The Internet represents one of the most successful examples of the benefits of sustained investment and commitment to research and development of information infrastructure.

2.2 The Concept of internet

Internet is an inseparable part of today's educational system Oghenetega & Igere (2014) that has come to enrich our educational system in terms of availability, accessibility, and its benefits. Many researchers look at internet in different perspectives. It is seen as a collection of millions of computers around the world that are interconnected and serve as a medium that does not have the limitation of information on each user (Puspita & Rohedi, 2018). It provides a platform where people of diverse backgrounds get connected and share ideas pertinent to them. Also, the Internet is considered to be the most prominent invention in modern technology as well as the modern revolution of information and communication technology (Yusuf, 2006). Since its invention, it has shown its prominence as a modern technological tool that has transformed the entire world. Providing opportunity for the users, the computers are not connected by cables but made possible only by the internet. Internet has added to our lives and has also made certain things disappear (Syed, 2017). People from afar can get connected and share ideas, access information and serves as a medium for positive interaction. In the view of Shahibi and Rusli (2017), internet is a basic technology in the development of information technology. For information technology to be possible and useful, the internet which serves as the fundamental block and which serve as medium for transmission must be present. To others, internet is a platform where millions of people engaged in the creation and exchange of information (Shahibi & Rusli, 2017). Several users are given limitless opportunity to get engaged in academic discourse resulting in enriching the academia. This therefore enables the information to be networked and get communicated to others using similar tools. Internet can be seen as an international computer network of information that are always available to the public through modem links. Its

availability makes it a unique platform for users to link up with others across the globe for information sharing. In this case the internet provides the links enabling the computers to get connected for the information to be transmitted. To Soegoto and Tjokroadiponto (2018), the internet is one result of sophistication and advancement of science and man-made technology. It ensure a successful application of scientific knowledge leading to further advancement of science and technology.

In the of Soegoto and Tjokroadiponto (2018), man's quest to making life better, uses the scientific knowledge through technology to advance in life and create sophisticated materials that result in the internet. The usefulness of internet cannot be overemphasised as a common interface that is always available for the larger community to get connected. As such, internet is a very useful tool that opens up the entire world thereby developing the universe that connect millions of computers together by a common network protocol and user interface Syed (2017). Once the tools are available, using the interface one can connect with millions of other users in the world. To Syed (2017), Information is just a finger touch away from the user and assuming that it would not be inappropriate for anyone to say that the Internet has become the biggest global digital information library, that provides the fastest access to the right kind of information in nanoseconds to end user at any time and at any place in the world. Its accessibility is very easy as far as one is connected and variety of information will be present for one to access. Hence, Internet can therefore be described as a super highway of information carrier, where information seekers on any subject or area of discipline can obtain current and useful information and knowledge (Syed, 2017). Leaving no barriers, information can be obtained outside the traditional classroom where the presence of the teacher does not matter. Internet bring about big amount of useful information that helps a student's professional

development he receives from other sources outside an educational establishment (Glazunova & Voloshyna, 2014). In terms of enhancement of research, Kamba (2008) holds that the internet has not only reduced the need to store information resources but has also increased the output of research publications globally. Syed (2017) also opine that Internet can be beneficial to students as it allows them to obtain relevant academic information.

Internet may also present some harm and dangers to its users. To Syed (2017), Internet can offer other possibilities that may be harmful to their academic experience. In this regard, Hicks (2002) sees internet as a double- edged sword, in the sense that students can access any educational database; learn about any country and can also be subjected to perverse and defiant topics. Aside the Internet itself that may not be beneficial to its uses, the way students use the internet can either make it beneficial to them or not.

2.3 Importance of Internet to Science Student Teachers

The internet now represents one of the most successful examples of the benefits of sustained investment and commitment to research and development of information infrastructure (Howe, 2007). The effort that researchers have put into bringing the idea into the lime light is yielding fruits now. Users like never before are counting so much on internet to provide with their information needs. The use of internet is increasingly becoming very popular and its importance is far reaching especially in the life of researchers. Fescemeyer (2000) stated that in a survey that about 50% of the scholarly publications that were obtained were from the internet. Fescemeyer (2000) further stated that those who studied geography students' use of internet by analysing citations from the test found that about 51% of the citations

referred to sources on paper, 47% of the sources were from the internet and the rest were course manual. Internet is therefore a major tool to access information for research purposes.

Internet is also very important to teachers who are practitioners in the field. In deciding on what to teacher to students, teachers are often left at a cross-road as to how much information to give to students. Chifwepa (2003) discovered a very high internet usage by the staff of University of Zambia where 94% of the 37 staff used internet. According to Chifwepa (2003), the major motivation for the use of internet by the University staff were the convenience of the internet (82.9%), the usefulness of the internet (80.05%), free access to information and software (71.4%) the ease with which internet present the information (68.8%). Internet use very ell embraced at the higher education level. The high percentages is an indication that teachers see it as a good platform to satisfy their information needs.

Due to its importance to students, Berson (2000) holds that internet access in schools has increased greatly over the last 20 years. The importance of internet to students is diverse. Besides, it also present to the user the method or steps to follow in order to get the information. The importance of internet can manifest in the fact that the end user is aware of the diverse information available on the internet and educated in the criteria by which the information content should be accessed (Berson, 2000). The internet is a valuable source of information used by students in projects and assignments. Students only need to get access to the internet resources and a varied information on the topics are presented for them to choose from to complete the project or assignment.

2.4 Types of internet resources

Internet is considered a very important resource for academic works. It provides very important information for varied users. Many researchers have delved into the types of internet resources and it is revealing to note that several resources abound in the internet.

In a study conducted at Aligarh Muslim University on the Information Searching Behaviour of internet users, Nazim (2008) tried to determine the extent to which internet users were aware of internet resources and services availability. The study also examined the internet searching behaviour of internet users using questionnaire. The study revealed that the online database as well as e- journals were the preferred resources users sought to use for information. According to Nazim (2008), e-mail, World Wide Web and search engines were recognised by the respondents as very important internet services that were useful to them.

To determine the Internet access and use among Business students in Darul Ihsan University, a pioneer private University in Bangladesh, Mostofa (2011) used questionnaire a data collection tool. In that study, the survey findings revealed that a high percentage of users are students and they purposely use Internet for educational purposes. He found that students' access point of Internet was the University campus where it is provided for the use of the students. Mostofa (2011) found Google and Yahoo as search engines that were more widely used by students to access information for their academic work.

In their work on the types of academic internet resources for IT students' individual work management, Glazunova and Voloshyna (2014) did a very extensive categorisation of internet resources. According to them, internet resources can be

categorised into three. These are formal, non- formal and informal. Under the formal type of internet resource, they identified; educational resources portal, electronic library resources and educational resources video sharing. Under non- formal type of internet, they found social net comprising of blogs and forums, MOOCs comprising courser, Udacity, Khan Academic and Prometheus. Finally, under the informal type of internet resource, Glazunova and Voloshyna (2014) identified magazines, books and news. To them using specially made academic resources such as a video lecture, a lesson in electronic academic courses enables increasing effectiveness and students' satisfaction of academic process. Such non-formal instruments for gaining new knowledge and abilities as professionally oriented sites, thematic webinars widen students' opportunities in self and professional development (Glazunova & Voloshyna, 2014)

Sahin, Balta and Ercan (2010) looked at internet sources from a very different point of view. In their work on the use of internet resources by university students during their course projects elicitation: a case study, they hold the view that even though the Internet is a very important and indispensable source for students, the issue of whether the referenced source is trustworthy and/or credible, has been raised. In their opinion, this is because there is no control on any particular piece of information published through the Web, in opposition to the scientific and professional journals published by the scientific institutions, business world and the organizations known to the public. Additionally, they maintain that other journals and books issued by commercial organizations do not have a control unit including editors and referees. They further indicated that Many of the sites on the Internet enable anybody to submit any kind of information without being controlled, and many of the sites known as reliable are restricted to open access for commercial purposes or security

requirements (IP restriction, membership). According to them, this limits the accessibility for students and deprives them of these sites.

Ahmed, Begum and Fasquel (2017), view electronic resources on the internet as manifesting themselves in numerous flavours and categories. Assessing availability of resources on the internet in his study on the usage of internet resources among users, Ahmed, Begum and Fasquel (2017) noted that the number of resources available on the internet today is immense. He identified the resources as: Electronic journals, electronic conferences, online- courseware and tutorials, patents and standards, electronic preprints, Science news and communication, technical reports, and electronic thesis and dissertation. He holds that companies, organisations, educational institutions, communities, and individual people all serve as information providers for the electronic internet community.

There have serious research works done to explore the trends and practices of accessing online information on Science academics of higher education in developing countries. These studies conclude that Faculty members of sciences are seeking e-modes to meet their e-scholarly information needs. This is evident in a study by Ingwersen and Jarvelin, (2005) on Information sources available to engineers' point of views and categorically stated that information sources could contain relevant information. Sources of engineering information can also be classified in various ways, namely technical or non-technical, oriented to project or to profession, public or private, printed or generated on site, and of continuing or ephemeral value. Information sources can also be distinguished as external and internal sources, human and documentary sources, or formal and informal sources of information.

Information is accessed through various channels ranging from the internet to text books. An information source contains relevant information whereas a channel guides the user to pertinent sources of information (Ingwersen & Jarvelin, 2005).

2.5 Time Spent on the Internet

Varied users of the internet spend different time on the internet and this has different effects on the users. Olatokun (2008) found that adolescents today spend quit significant amount of time using the internet for varied reasons. The length of time spent on the internet can have adverse effects on the user if the usage is not managed well. There is clear evidence from research that shows that excessive use of the internet has been linked to the problems of maintaining daily routines, school performance and family relationships (Rickert, 2001). According to Rickert (2001), users who spend too much time on the internet have the problem of carrying out their daily assigned duties. It can also influence how users perform in school and their relationships. Research also show that different level of users put the internet to different uses. According to a research conducted by Bragdon and Dowler (2016) to access College Students' technology usage and their academic performance found that students in the upper level spent significantly more time using technology for their academic work but students of lower level spent more time using cell phones, online chatting and social networking. Research has also found that significant number of secondary school students in Nigeria had been grossly involved in using the internet in their daily lives ranging from four to five years now (Olatokun, 2008). The internet has become a daily routine for some users and hardly a day passes by without them using the internet. As can be concluded from Bragdon and Dowler (2016), students can spend as long as 42.8 hours a week engaging in some forms technology. Averagely, this is a considerably a long time spent on the internet.

Young (2006) conducted a research to find out the effects of internet and social media on the academic performance of students in Korea. The results indicated that students who have better academic results spent more time on the internet than those whose grades were weak. The research further found that majority of the respondents were of the view that internet provided a very important information source that could be used for widespread knowledge, wisdom and entertainment.

The time users spent on the internet has also been of interest too researchers on this area. Ogedebe (2012) observed that most users more especially students prefer browsing the internet during the night hours than the day time. Ogedebe (2012) found that students would prefer to forgo sleep to brow the internet than to do it during day time. Time spent on the social networks has been found to pose significant negativity on the academic performance of students. Over time spent on the internet can lead to obsession and can be injurious to academic performance. As is of the view of Ingwersen and Jarvelin (2005), which excess involvement of or obsession with social networking by students can have negative impact on their academic performance. On the issue of who is more likely to be addicted to internet, many researcher again have waged into it. According to Ogedebe (2012), students are more likely and particularly at high risk of developing internet addiction since they are have free time available to them, there is no monitoring because they are away from their parents and to get away from tough routine assignments.

A study conducted by Emaka and Nyeche (2016) on the usage of internet on the academic performance of undergraduate students at the University of Abuja, Nigeria revealed interesting findings. The results from the research showed that 55% of the respondents use the internet every day. From the 111 respondents, 15% of them

use the internet once in a week, 5% of them use it once in every two weeks. Also, 13% of the respondents use the internet once in a month, 10% use the internet occasionally and 2% of them do not use the internet at all. The study therefore concluded that internet is one of the beneficial tools in this era of information technology, not only for business but for academic point of view and enhances the skills and capabilities of students which could be of help to them in their studies and professional life.

It is therefore, seen from the available literature that there are different purpose to which people put internet use to. It is found that overuse of the internet can lead to addiction of students. The addiction can also consequentially negatively impact the academic performance of students.

2.6 Effective use of internet for academic work

Internet plays a very important role in the life of students these days since the attention of students have now shifted from the traditional libraries to the internet and its emergence in education has greatly improved teaching and learning in schools (Chirwa, 2018). To this end students rely heavily on the internet for their studies than they do on the libraries. This is because, internet use makes it possible for new ways of communicating ideas across the globe thereby simplifying social interaction among people leading to effective learning as communication can get across from distant places, countries and continents through varying social networking interface Ogedebe (2012). Other researches done to study the access and use of internet among students also affirms the fact that high percentage of internet users were students who used internet for educational purposes (Mostofa, 2011). According to Mostofa (2011), students' access point is mainly the University where free internet connectivity is

provided. Source indicate strongly that the ratio of the internet usage for educational purposes for deep learning and by the students who are given assignments by the internet are higher when compared to the surface learners (Mostofa, 2011).

Sharing of information through the internet has made it to become a reliable tool and its use as an instructional tool in higher education is rapidly increasing and gaining prominence (Adediran & Kehinde, 2013). According to Adediran and Kehinde, there is an increase in the development of academic course websites with huge amounts of learning materials imbedded within them, allowing access to good and varying information and improving effectiveness of learning.

An effective use of internet does not only bring about an improvement in pedagogy and enhanced learning of content but also has an added advantage of saving time and space (Chirwa, 2018). Some other researchers are of the view and pointed out that information retrieval, individualised learning, group learning, and collaborative activities would greatly be enhanced in education through the use of the Internet which has a long term effect of making learning to improve. Yusuf (2006) holds the view that the ability to find and retrieve information effectively is a transferable skill useful for future life as well as empowering the positive and effective use of the electronic resources while study in the institution. The role of the internet that allows access to the e-book, search information easily and assist students in completing the task will be significant in increasing student academic achievement (Shahibi & Rusli, 2017). To Nazim (2008), the academic staff spent more time on internet than students and research scholars and so allowed with a variety of information to pick and improve themselves. Students spent less time on the internet which does not help them much in their quest for academic excellence (Nazim, 2008).

Chen and Pen (2008) found a very strong relationship between internet use and the academic performance, interpersonal relationship, psychological adjustment and self- evaluation I their survey. The used questionnaire to collect data from the university students, the results from the survey showed that non- hefty internet users have good relations with academic results and academic growth. Hefty users did not get good academic results and academic growth since they used the internet but not for academic purposes. Chen and Pen (2008) however believe that internet use and students performance can have negative relationship if it not well regulated. To know the impact of internet on users, Chen and Pen (2008) opined that addiction can be one of the most impacting thing internet resources can offer its users. They indicated that the problems can come in three dimensions. These are;

- Withdrawal and social problems
- Time management
- Performance and reality substitution.

To determine the impact of electronic journals collection on the faculty and doctoral students King and Montgomery (2002) carried out a research. The results of the research revealed that:

- Faculty members and students did not get any impact of electronic journals in terms of amount of reading and time spent
- Faculty members acquired the research articles through their personal subscriptions but students get their information through the library provided articles
- Research scholars and staff try to get the electronic sources from the library or through free internet resources. As such they read more to access electronic journals required for their research projects

- Library is a good source of information as compared to others
- Most electronic articles are updated and the use of older articles are increasing among the scholars and university teachers.

Reddy (2010) studied the access and usage patterns of information needs of users and found that the library is used regularly by scholars. The study also found out that there is a significant level of use and satisfaction; scholars also clearly expressed the desire for more journals and for access to electronic journals.

Reddy (2010) also conducted similar research on information access patterns of faculty in Arts and Sciences Colleges in Chidambaram concluded that more than half visit the library daily or once a week and use books or reference works most often. They generally visit the library to prepare for classes or to update their knowledge. The mass media most often used periodicals and the Internet. The library catalogue is not a satisfactory means of information retrieval for most respondents.

Other research works reported that academic staff have various reasons for using information sources. King and Griffiths (1991) found that generally four motives are usually common. These include:

- Ways to keep them informed about new techniques and methods being employed in their field.
- The application of the information to specific work-related activities (such as new ways of impacting knowledge that could be used for specific teaching and research).
- To prepare various communications, such as written reports, plans or proposals, journal articles or interpersonal communication in the form of information presentations, consultation or advice.

- Requiring information necessary for professional development or continuing education.

Similarly, Francis (2005) examined how 26 social science faculty use library resources with the topic -information-seeking behaviour of social science faculty at the University of the West Indies, St. Augustine Campus. Findings revealed that participants demonstrated similar behaviour patterns to their colleagues both in the developed and developing world. They strongly relied on textbooks to support their teaching and on journal literature to support their research and current awareness activities. However, findings also showed that over one-half of the social scientists expressed a preference for access to journal articles in electronic format, which are a new development and a reflection of the increase in orientation to electronic products.

Adeoye and Popoola (2011) postulated that for effective use of information resources by the teaching staff, there is the need for current and adequate library resources, provision of Information and Communication Technology facilities, appreciable level of information literacy amongst the teaching staff, provision of professional librarians to manage libraries and conducive reading environment

2.7 Effect of students' internet use on their performance in science

As the internet is gaining prominence recently, many researchers have been looking at how it influences the learning of students thereby impacting the academic achievement of them. Even as researchers have looked at different aspects of the internet; be it for communication purposes, for games and leisure purposes, for business purposes, the use of internet for academic purposes seems to take centre stage with researchers engaging in academic discourse on how it impacts the academic achievement of students in different stages of learning.

In researching on the use of the Internet among final year students of the Faculty of Information Management, Universiti Teknologi Mara, Puncak Perdana and the impact of its use on their academic achievement, Shahibi and Rusli (2017) carried out a quantitative survey on 206 respondents using questionnaire as the main instrument. The data obtained was analysed using frequencies, percentages and rank orders. They found the use of Facebook, the internet, media usage for online education, online media usage for non- education and students interest in the university as the factors that affect student's academic achievement. The results showed that Facebook had a positive correlation in influencing students to improve their academic achievement. They also found that online media usage for education and non- education play an important role in influencing students' academic achievement.

Adediran and Kehinde (2013) carried out a research on gender and internet use pattern on pre- service teachers in a Nigerian College of Education. In their work, they administered questionnaire to 194 final year students of federal college of education, Abeokuta to collect data on internet use pattern of students. The results indicate that getting information for school work, communication, chatting and social networking are the major use to which the students put the internet. Their findings showed that there is a significant difference in the general internet and specific use of the internet by male and female participants, while there is also a significant difference in the general feelings of the male and female participants to internet use. This indicates that gender affects both use and feeling of pre-service teachers about the internet. It therefore implies that gender is a major factor to be considered in use of as well as feeling about the internet.

Makinde, Abdullahi, and Bolaji (2018) also undertook a research on the assessment of internet services availability, accessibility and utilisation for professional development of secondary school teachers in Lagos State, Nigeria. They randomly selected and administered questionnaire to 188 teachers Education District 1 in Lagos comprising of Alimosho, Agege and Ifako/Ijaiye secondary school teachers. The study revealed that the available internet services in secondary schools were not adequate. The accessibility and usage was a matter of concern.

2.8 Information needs of Tutors

Tutors at the Colleges of Education need to be well informed in term of their mastery of the information to present to students teachers. However, there are times even the tutor himself lack the basic information to be able to deliver satisfactorily. This therefore creates a gap in delivering quality information to students thereby creating a need for the individual. An individual's information needs arises in a case of a problematic situation or information gap, in which his or her internal knowledge and beliefs, and model of the environment fail to suggest a path towards the satisfaction of his or her goals (Case, 2007).

Much of the problem comes when the information available is not managed well. As the amount of available data grows, the problem of managing the information becomes more difficult, which can lead to information overload. Information overload refers to the state of having too much information to make a decision or remain informed about a topic (Wikipedia, 2015). This information explosion and information overload gave birth to the concept of studying the information needs and seeking behaviours of different groups of users. Information

need is an individual or group's desire to locate and obtain information to satisfy a conscious or unconscious need (Wikipedia, 2015).

Reddy (2010) found out in his study on information needs and information-seeking behaviour of college faculty and concluded that college teachers mostly seek information for lecture preparation, improvement of their personal competencies and current awareness useful. They mostly use books and monographs for seeking information, while they frequently use to discuss face–to-face with colleagues and friends as an informal source of information.

Reddy (2010) maintained that teachers frequently acquire information resources from their institutional library and use their personal collection when they have urgent need of some information.

Tahir, Mahmood and Shafique (2008) did an extensive work when they studied the information needs and information-seeking behaviours of the faculty of Humanities and concluded that Humanities scholars' information needs are diverse and they rely heavily on books and older material because there is lack of availability of required material in libraries which is a major problem in information seeking.

Reddy (2010) in studying the information needs of teachers and research staff working in the Social Sciences Department of the University of the Punjab, Lahore found information needs of teachers very important. The study showed that teachers required information mostly for teaching purposes and they used both formal and informal sources.

Fazlul (1976) conducted a study to know the information needs of teachers. According to the results, the teachers were consulting text books for the preparation of

class lectures. The main sources of obtaining new ideas for information were current journals, latest books, news magazines, research reports and conference proceedings.

Chaudhary (1977) studied the information needs of science teachers. The study revealed that 94% of science teachers were using textbooks and 43% use current journals. To keep themselves up to date, they usually consult journals.

Anjum (1978) probed the information needs of the Humanities faculty members of University of Punjab, Lahore using a questionnaire supplemented by selected interviews. Major findings of the study pointed out that humanist scholars were less interested in informal sources of information.

Loughridge (1990) carried out a study on management information needs of academic Heads of Department in universities in the United Kingdom identified that while teaching and research were obviously central to departmental activities the Heads of Department also recognised the importance of attention to management of resources, maintenance and development of external links, response to external demands, attracting students and repositioning their department in the market-place.

Ajidahun (1990) studied information needs of Faculty Members in a Nigerian Private University: A Self-Study concluded that there is no significant difference between the information needs of lecturers in Nigerian private universities and that of their colleagues in public universities. Monographs and journals are the main information sources used by faculty members in Nigeria and elsewhere.

There are many researchers who have examined the information needs of faculty members in tertiary institutions. As can be seen in his findings, Ajidahun

(1990), which established that the information needs of faculty are job-related, specifically to teaching, research, and publication.

It is quite interesting that researcher find undergraduate students seeking information in relation to their academic and research needs as a necessity. To this end, it is quite obvious to conclude that the desire of students to satisfy their educational and academic information needs influences them to seek information. Tackie and Adams (2007), saw in their work that literature on information needs and information seeking of students is quite interesting and acknowledge that work related information seeking is different from everyday information seeking. In their view, information influencers, such as accessibility, availability, and familiarity of source consumed determines the suitability of the information.

2.9 Information seeking behaviours of student teachers

Student teachers information and information management has a very serious impact on what and how they learn and retain information. There are diverse approaches to seeking information by student teachers.

Thanuskodi (2010) conducted a study on information-seeking behaviour of medical students. The study revealed that the respondents use IT-based library sources and facilities less frequently compared with printed sources. Similarly, it is also noted that email is the most popular Internet application, whereas other Internet-based services and applications are only used by a limited number of respondents. This is a matter of concern, as presently, electronic information sources and the Internet are considered extremely important tools for effective teaching and research.

Shokeen (2002) also did a study on information seeking behaviour of social scientists working in the universities located in Haryana. The study found most of the social scientists visiting the library daily for information. It was revealed that the first preferred method of searching the required information by the social scientists was by searching through indexing and abstracting periodicals, and citations in articles respectively. The social scientists use current journals followed by books.

Cothey (2002) examined the information seeking behaviour of 206 college students using the World Wide Web during a 10-month period as a means to suggesting how the general population uses the web. It was concluded that World Wide Web users have become more passive and more eclectic as they become more experienced using the Web. It was also discovered that they use less querying techniques; however their Web usage was more irregular, which might suggest greater selectivity.

Bhatti (2009) researched the information needs and information-seeking behaviour of Faculty Members and the findings indicated that information seeking may be motivated by a wide variety of needs, including personal, professional, entertainment, etc. The successful operation of a library depends to a large extent on the choice of library collections. The collection should meet the needs and requirements of users. Consequently, librarians must be aware of how faculty seek information. Knowledge of faculty information needs and information-seeking behaviour is imperative for developing valuable collections, and improving facilities and services.

Suriya, Sangeetha and Nambi (2004) carried out a research on information seeking behaviour of faculty members from Government Arts Colleges in Cuddalore

District. The purpose of their study was to investigate, how faculty members seek information from the library. It was concluded that most of the respondents 61 (38.12 percent) used to visit the library several times a week to meet their information needs.

Similarly, Lewin and Stokes (2004) explored the information-seeking behaviour of a group of lecturers, based on one site, delivering a nursing and midwifery curriculum in the School of Health Studies of a higher education institution. Findings showed that in order to access information, lecturers were most likely to access the institutional libraries, the Internet, advice from colleagues and their personal collections. Refereed journals were the top ranked information resources with professional studies and research cited as the most sought after topics. Lecturers mentioned the role of library staff as integral to the information-seeking process.

Marouf and Anwar (2010) researched on Information-seeking behaviour of the social sciences faculty at Kuwait University and found that respondents heavily depend on books and journals for teaching and on a larger variety of materials for research purposes. Their use of informal sources is comparatively less than formal sources. Journals and books are considered as the most important sources to meet their needs. Among the informal sources are conferences, the subject experts and colleagues are given higher importance than librarians and government officials. Journals and books are used more frequently than raw data, technical reports, manuscripts and primary materials.

In order to get a complete picture of information behaviour, the consideration of affective and conative elements are important in addition to cognitive ones (Solomon, 2002).

The cognitive uncertainty in relation to unfamiliar situations or problems arises as a consequence of one's rational judgments of required knowledge level and progress in work. Affective uncertainty is related to insecurity and pessimism. In the use of information systems merely technical skills are not enough; also a positive attitude and self-confidence are needed in order to cope with the systems.

Emotional aspects like feelings of frustration, impatience, information overload, resistance to new information and computer aversion may form barriers to the search process. The feeling of uncertainty, often expressed as anxiety or worry, is particularly strong at the beginning of a search process, when the users become aware of their lacking knowledge about the topic (Kuhlthau, 1993). Although anxiety in connection to intellectual work usually is a temporary state, certain individuals may be particularly vulnerable to feelings of stress and worry in an information-seeking context (Heinstrom, 2003).

Although the process of seeking information may involve a wide range of negative experiences of frustration and anxiety, it may also trigger positive responses like excitement and satisfaction (Solomon, 2002).

A successful search process evokes positive emotions, such as joy, interest and exhilaration, and consequently encourages the searcher to continue and extend the searches. As topical knowledge is extended, confidence usually grows. The thoughts develop from being vague and confused to being clear and knowledgeable. Information seeking is consequently a cognitive and emotional process of constructing a personal understanding of a topic (Kuhlthau, 1993).

Solomon (2002) has noted that information seekers are characterised by typical patterns of affective responses and differ from each other in the intensity of their reactions.

Motivation and interest influence the way information is used and critically evaluated. The more interested we are in the topic, the more information we seek about it. Since people have a limited capacity for assimilating new information, particular attention is paid to information which can be related to previous knowledge. Information that confirms our previous values are particularly welcome and facts that do not correlate with our own views are often ignored. A cognitive style is another aspect of knowledge creation with an influence on information behaviour.

Individual differences related to cognitive styles and study approaches come into play in database searches, on the Internet and in virtual environments Heinstrom (2003). Students with a holistic learning style are, for instance, more explorative in their searches, while their serialist counterparts build their searches in a narrower stepwise fashion (Heinstrom, 2003)

Wilson (1999) states that the origins of human seeking-behaviour are found in work on users of libraries and in readership studies in general. Wilson posits that the post-war increase in the amount of scientific literature led in 1948 to the Royal Society of Scientific Information Conference (1948), which marked the beginning of the modern study of human information seeking-behaviour.

Information seeking has often been compared to a rational problem-solving process, where a gap in knowledge triggers a conscious search for information.

Solomon (2002) disagrees with this accession and argues that this may not apply to some situations, but it is dependent on the context and to a large extent on the individual performing it. Some people may plan and structure their searches, while others gather information in a more flexible and spontaneous fashion. The reasons behind different information approaches may lie in the context, but may also be due to person's inner processes and needs (Solomon, 2002).

2.10 Challenges student teachers face in using internet for their academic work

Several factors and impediments hinder the successful usage of internet by students (Makinde et al, 2018) that militate against access to information. Internet according to them, cost, infrastructural inadequacies, lack of skills, lack of relevant software and limited access to the internet are some of the challenges to the use of internet. They further opined that internet service companies provide poor services to their clients who are unsuspectingly exploited and defrauded. They were of the view finally that much of the challenges could be laid on the fact that power supply to especially rural areas are inadequate and hence schools located in those areas are no able to get access to internet thereby being cut- off from the information superhighway.

Jagboro (2003) observes that the introduction of internet in education has not revolutionised education and that a great deal of internet equipment which are worth millions and purchased by educational institutions remains unused or under- utilised, making such equipment become obsolete even as internet services provide a modern way of teaching and learning, electromagnetic radiation, straightening of eyes and distraction of organs are the harmful effects users have to contend with (Yusuf, 2006). In looking at challenges facing users of internet, Nazim (2008) identified slow speed

of internet, lack of training, and information overload as the very important factors affecting the usage of internet.

Adediran and Kehinde (2013) posit that some problems students face in their use of the Internet include slowness of the server and payment for the access time. Students sometimes have to buy data on their own to get access to the internet putting so much pressure on their pockets. The internet itself can be frustrating to the students by its slow nature making students unable to quickly access information for their academic purposes. The Internet can be beneficial for students as it allows them to obtain relevant academic information can also offers other possibilities that may be harmful to their academic experiences (Syed, 2017). In their work on the Information technology internet usage among the undergraduate students in eastern province, Nafrees, Roshan, Baanu, Nihma and Shibly (2020) found that students have problems using the internet because of slow internet, power failure and high cost involved in getting the internet connectivity. To Olatokun (2008), the greatest challenges to the full utilisation of the internet are inadequate access, inherent risk and problems of pornography, scams among others. Such challenges sometimes deter students from using the internet which could have been a very big opportunity for students to learn leaving students with teachers and lesson notes as alternatives. In a work to study the internet access and usage by University of Botswana students, Ojedokun (2001) found that computers with internet facilities were still inadequate which made students to loss the opportunity to get access to the internet.

A number of researcher found that the major challenges which can be summarized as difficulties in accessing online information resources were inadequate personal computers, lack of information on how to use electronic resources and lack

of time to adequately prepare and acquire the needed skills to be able to use online resources. Discussing the issues related to the accessibility of internet resources, Oduwole and Akpati (2003) revealed in their study that respondents declared that insufficient computer terminals were the major issue hindering the access of online resources. According to Oduwole and Akpati (2003), other issues respondents saw as challenges were the issues of recurrent power outage, computer literacy problems, finding appropriate subject terms and the uncooperative attitude of library staff. To them these were the challenges that users had to encounter in using the online resources. Oduwole and Akpati therefore see the challenges emanating from the use of internet as either natural or artificial. They added that poor management and having low skill library professionals can be another challenge users are confronted with in their attempt to access the digital resources.

Nwezeh (2010) found very interesting revelations in his research. According to him, some users pointed out that lack of time to access the online information resources was the major hurdle they had to face. He also found out that some users admitted they did have enough time to learn and get training to access the internet for academic research work. It was further revealed that lack of searching skills and ignorance of internet resources the other big hurdles users had to face to access internet. He finally pointed out that respondents considered lack of computers with internet and lack of computers in general were some minor challenges users were faced with. To some researchers, the issue of financing is a challenge in the use of internet resources. Ani (2010) found out that finance was the most important factor to provide equitable, affordable and sustainable internet resources. To Ani (2010), money was is seen as an important challenge to access the internet resources in Nigerian Universities.

To be able to effectively use internet resources and to reap the full benefits, the user must be aware of the availability of the resources. To some researchers many users are not even aware of the resources and its benefits to them and that is seen as a very serious challenges confronting users. Rehman Ramzy (2004) posited that the possible constraints to the use of internet resources to access information are lack of awareness, inadequate skills to use the internet and time constraints. Rehman Ramzy (2004) however, proffer formal training programmes, provision of library guides to users, organizing information literacy programmes to users and an active role of librarians as ways to overcome those challenges.

The challenges can also be seen in terms of users' inability to navigate the internet resources. Deng (2010) identified five major areas in which users encounter the challenges to use the electronic resources. Those areas according to Deng (2010) are:

- Searching
- Navigating
- Finding
- Accessing
- Downloading

Challenges according to Xie (2006), get students frustrated while using the electronic resources. To him the causes of the frustration in trying to access online resources are

- Confusing search interface
- Amount of time spent searching for information
- Restricted access to certain sites

- Scanning and downloading
- Internet connectivity
- Availability of computers
- Requirement for login, password and membership.

Manda (2005) conducted a research to find faculty members and students use of internet in Tanzania. The research found that academicians in Tanzania face a lot of problems using the internet as a result of those problems the use of internet is very low among faculty members. The researcher found the following as the challenges facing the use of internet resources.

- Inadequate end- user training
- Slow or no internet connectivity
- Limited bandwidth to connect to the e- resources
- Lack of computers to access the e- resources

Aside the challenges that have been enumerated so far, some researchers thought of training to use the internet resources was a major challenge to many users. To Baro, Benake- ebide and Ubogu (2011), the challenges users have to face in using the internet resources are;

- Lack of skills,
- ineffective user education
- time constraints
- efficiency of server
- Poor electricity supply.
- According to Baro et. al (2011), these are the main hindrance barring the effective use of online electronic information resources.

Staff and faculty members of private universities face many challenges in information seeking. According to Hoggan (2002), there are challenges of information overload; misinformation, fees, poorly designed navigation, and loss of ability to brows all hamper the members of staff of private universities when searching information from the internet. In addition, many staff/faculty members rely on only one or two databases and often miss unique information that is available through other sources. Hoggan (2002) attributes challenges associated with information seeking behaviour of private universities staff and faculty members to information overload, web site navigation, preprints, financial concerns, reliability and scholarly misconduct and misinformation.

Peer-reviewed articles are available on the web, but they are usually published in fee-based e-journals. Access to these resources via personal online subscriptions or, more commonly, institutional online subscriptions paid for by their libraries (Line, 2001). For researchers not associated with an institution, such as retirees or independent consultants, these fees are barriers to information access (Line, 2001). Even researchers with access to a small private library may be discouraged from requesting journal articles because of the cost involved. Some information resources are available at no charge, but they tend to be unreliable. For example, Pub SCIENCE, a free web-based database for physical scientists maintained by the U.S. Department of Energy, may be discontinued because the U.S. Congress feels that it is an undesirable duplication of private-sector activities (Line, 2001). Some private-sector online services offer free content, but they are much more likely to go out of business than the fee-based services (Line, 2001). Thus, financial concerns can limit student teachers access to scholarly information.

According to Hoggan (2002), print journals do not experience technical difficulties. However, when a publisher's server goes down, access to electronic content is temporarily lost. Compounding the problem is the fact that access to many electronic resources is rented rather than owned, so if the institution cancels a subscription, access to back files is lost. With a print journal, on the other hand, the previous volumes of the journal would still be available after a subscription was cancelled. Because of these issues, librarians and academic staff cannot rely completely on electronic resources (Hoggan, 2002).

There are other issues of scholarly misconduct challenging the usage of internet. Scholarly misconduct includes plagiarism, fabrication of results, and manipulation of data (Calvert, 2001). Researchers have been known to manipulate numbers and even publish lies (Calvert, 2001). In addition, many publications include incorrect bibliographic citations and other errors. It is already difficult for editors of print journals to detect scholarly misconduct and other errors, and the chance for misinformation to slip past an e-journal editor is even more likely given the faster turnaround time of online-only journals (Calvert, 2001). Online journals may actually attract dishonest scholars who want to pad their resumes with quick, fabricated publications (Calvert, 2001). In addition, scholars can publish results and papers on their personal web sites without peer review. Information found online cannot therefore be seen as entirely holy as some of them are not peer reviewed. Online discussion groups often contain biased information or information taken out of context (Calvert, 2001). Thus, the potential for misinformation on the web is a real concern for academic researcher. Users at time find it difficult to locate the right resource to find the needed information due to their difficulty in using the internet appropriately.

Another research conducted by Onwuchekwa and Jegede (2011) on information retrieval methods in libraries and information centers in Nigeria found on challenges associated with information seeking by users identified a number challenges associated with information-seeking behaviour of internet users. They found out that respondents difficulties were experienced when they were attempting to make initial decisions with regard to their information-seeking action. Stumbling blocks identified were: an inability to represent the subject of the need in effective search terms; an uncertainty as to how to define the limits of the search; and an ignorance of the types of sources most likely to be of value in satisfying the need. The study also found out that when respondents are looking for information, they become frustrated if:

- the search consumed more time than the person felt was reasonable
- tools such as search engines directed the user to sources that could not be accessed
- difficulties were encountered in spelling the attempted search terms
- the tracing of accurate information proved onerous and
- the structure of the source with which the researcher or respondents was interacting was not found to be intuitive.

Other challenges stated by Onwuchekwa and Jegede (2011) were that retrieved materials were deemed unsatisfactory, if:

- it did not address the issue in question
- it failed to include information of the type needed
- there was insufficient useful material to meet the need
- the pertinent content was so great in volume as to overwhelm the searcher

- coverage of the matter in question was too superficial
- much of it was considered irrelevant to the topic motivating the search and
- parts of it were found to be inaccurate.

It also proved difficult in one instance to determine whether particular content was truly appropriate to the focus of the assignment in question. After accessing an adequate quantity of suitable material and looking at how the material could be exploited within the context of the specific requirements of what needed to be done, some information seekers may be troubled by legal limitations on the use that could be made of the information and faced barriers when seeking to construct meaning from the material. For example when researchers found the information to be ambiguous when considered in the light of the need and discovered that the material seemed incompatible with content they had encountered previously elsewhere (Onwuchekwa & Jegede 2011).

According to Onwuchekwa and Jegede (2011), information seeking behaviour or the pattern of using information retrieval systems depends on a number of factors. Some of the challenges that affect the information seeking behaviour of the user are:

- The users' awareness of, and ability to access other sources of information
- The users relationship with the information unit concerned
- The information unit's ease of accessibility
- The users working conditions
- The time available to the user for consulting information systems
- The amount of competition that exist in the user's field of activities
- The users past experience or knowledge
- How easily the user gets on with other people

- How friendly, knowledgeable, and efficient are the members of the information unit.
- The various products and services of the information

2.11 Conceptual Framework

The theoretical framework was developed by analysing scholarly research works on the internet use and its effects on students' academic performance. The variables were identified from the theories, models, and frameworks and were selected as a theoretical framework for this research. In the figure 1 below, the models, framework and theories of some articles were reviewed, selected and used in this theoretical framework. Researches that have theories, models and framework very clearly and fulfil the requirements of this research work were the only choice for this research. From previous research, there are four factors found based on the researchers' understanding of influence of internet usage. These are internet availability, internet services, effective use of internet and internet resources.

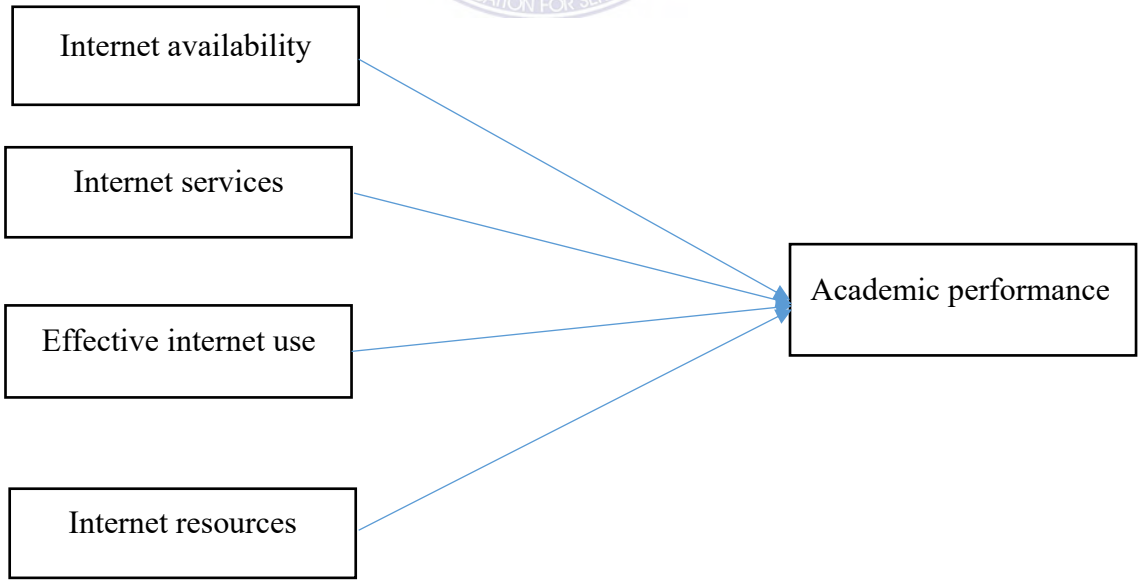

Figure 1: Conceptual Framework on internet

On internet resources, Sahin, Balta and Ercan (2010) conducted a research on the use of internet resources by university students during their course projects elicitation and found two categories of internet resources. The first category according to them was the public www that comprises of untrustworthy resources, trustworthy resources and trap sites. The second category was the limited access resources that constitute academic journals, scientific communities, and various software and distance education sites. To them, using highly accessible internet have may give fast results but the reliability of those sites cannot be guaranteed. They therefore concluded that the use of trustworthy internet resources is of vital importance for academic study.

Puspita and Rohedi (2018) in their work on the impact of internet use for students found internet to have negative impact since it results in students becoming addicted. They further found that use of internet are more likely to have negative and less supportive in learning activities.

Soegoto and Tjokroadiponto (2018) found interesting results in their work on effects of internet on students' academic performance and social life. They found that students' social life improvement is influenced by internet. They further found that the use of internet for academic purposes and academic achievement is directly proportional to each other and inversely proportional to students' social life.

Emeka and Nyeche (2016) on the impact of internet usage on the academic performance of undergraduate students revealed that internet is one of the beneficial tools in this era of information technology. Emeka and Nyeche (2016) asserts that it is not only for business but for academics that has the potential of developing the skills and capacities of students which can assist them in their professional life. They

however found that the problems encountered in the use of internet includes lack of computer skills, slow internet server and problem of paying for online services.

Jibrin, Musa and Shittu, (2017) found in their work on effects of internet on the academic performance on tertiary institutions students that internet is one of the beneficial tools in the era of information and communication technology used in academic exercise. They further revealed that some of the problems encountered in the usage of internet include slow internet speed and luck of stable power supply.

Yu (2012) worked on the internet influence to the college students' ideology and political education and observed that most of college students once sat down in front of computers to use chat tools. According to Yu (2012), most college students using internet rather use it to chat instead of academic purposes.

2.12 Theoretical framework

This work seeks to access the impact internet usage will have on the academic performance of science student teachers. The key terms the research is focused on are the internet resources, effective use of internet resources, and academic performance of students. Here, emphasis is put on how students will perform when they use internet for their studies. In this case, the research will look at the internet resources available to students and how they will use them for their studies.

The theoretical framework that guides this work is the sociocultural learning theory by Lev Vygotsky. This theory is so much related to this and can be clearly used to analyse the work. According to Vygotsky, learning revolves around three themes. These three themes are; culture, language and the zone of proximal development.

To Vygotsky, children are born with biological constraints in their minds. Each culture, however, provides tools of intellectual adaptation. These tools allow children to use their abilities in a way that is adaptive to the culture in which they live.

Language

Vygotsky believes that language develops from social interactions, for communication purposes. In his view, Vygotsky sees language as the greatest tool of man which is used as means of communicating with the outside world. According to Vygotsky (1962), language plays two critical roles in cognitive development. These are as follows:

1. It is the main means by which adults transmit information to children
2. Language itself becomes a very powerful too of intellectual adaptation.

At the Colleges of Education, student teachers use language in several forms and for several purposes. They communicate with themselves during their casual interaction with one another and when they in a learning situation. Those science student teachers who are familiar with the internet are able to influence their peer into also using it through their interaction. This has the benefit of encouraging those peers to also use internet since some have seen the benefits already.

Culture

According to Vygotsky (1962), culture describes the way a group of people do things; including the way they communicate. The science student teachers belong to a larger community known as College of Education. The college has its own culture with all the learners exhibiting similar characteristics as in learning by way of seeking knowledge. The College culture which includes the availability of resources and the way students seek information has a lot of influence on the way students learn. Hence,

the Colleges' culture influences the learning of the students. Also, in their quest to find information for their learning, they do a lot of communication. They communicate with their peers, tutors and even people outside the college community through internet services. As such, the way students relate with others plays a very important role on the learning of science in the Colleges of Education.

The Zone of Proximal Development

An important term in the sociocultural learning theory is the zone of proximal development. According to Vygotsky, the zone of proximal development is the gap between the intellectual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. This includes all the knowledge and skills a person cannot yet understand or perform on their own but is capable of learning through guidance. As learners are allowed to stretch their knowledge and skills, often by observing someone who is slightly more advance than they are, they are able to progressively extend this zone of proximal development. Hence, there are things that the students can do on their own and what they can only when they are helped. The gap between what they can do and what they cannot do on their own describes the zone of proximal development. The science student teachers can do on their own independent research to find information for their studies. There are equally times that they need help to be able to successfully accomplish a particular task either from their peers, tutors or IT officers in the Colleges. They must therefore need to go through scaffold in their search for quality and authentic information from the internet. As such, this theory very much relates to the work the Researcher is doing and it can be used to explain the work.

2.13 Summary

Internet resources play a very important role on the availability and access on the effective use of internet. It allows the user to be able to get access to the internet using the available internet resources to source information from the internet for studies. Internet resources come in varying forms under different categories. According to Glazunova and Voloshyna (2014) they can be formal which comprises of educational resources portal, electronic library resources and educational resources video sharing. Under non- formal type of internet, they found social net comprising of blogs and forums, MOOCs comprising courser, Udacity, Khan Academic and Prometheus.

Ahmed, Begum and Fasquel (2017) identified Electronic journals, electronic conferences, online- courseware and tutorials, patents and standards, electronic preprints, Science news and communication, technical reports, and electronic thesis and dissertation as types of internet resources. To him, companies, organisations, educational institutions, communities and individuals all serve as information providers for the internet.

Another important aspect of internet is its importance to the users and this is the main determiner of effectiveness of internet. According to Howe (2007), internet represents one of the most successful examples of the benefits of sustained investment and commitment to research and further aid in developing the information infrastructure. This has therefore made almost everything easy and fast thereby proving multiple ways of seeking information to solve problems that we encounter. To Sinha (2012), younger generation has accepted the internet as a means for getting information that could be relevant for academic work and research work.as against the

older generation who feel comfortable to use the traditional print resources available the libraries. According to Sinha (2012), a rapid change in information seeking behaviours and use of internet for online access to E-resources have become the vital part of various information needs of users.

The accessibility of internet has increased over the years making many people relying on it to source information to carry out their businesses. As Olatokun (2008) rightly put it that the use of internet has been embraced by all manner of people hence its usage will continue to increase as far as it continues to provide easy access. Ojedokun (2001) holds that the internet comes with many benefits to the academic cycle which according to him include provision of round- the- clock access to wide variety of information sources globally and has an added advantage of making provision to discuss and share experiences with colleagues to be able to derive maximum benefits from it.

The effect of internet to the user cannot be over emphasized. To get information for school work, communication, chatting and social networking are the major uses to which the students put the internet (Adediran & Kehinde, 2013). It improves access to information thereby making users improve in terms of the quality of what they do.

The use of internet comes with several challenges to the users. Several factors and impediments hinder the successful usage of internet by students (Makinde et. al, 2018) that militate against access to information. Internet according to Makinde et. al, (2018) is challenged by cost, infrastructural inadequacies, lack of skills, lack of relevant software and limited access to the use of internet. They further opine that internet service companies provide poor services to their clients who are

unsuspectingly exploited and defrauded. They were of the view finally that much of the challenges could be laid on the fact that power supply to especially rural communities are inadequate and hence the schools that are normally found in those areas are usually not able to get access to internet thereby cutting them off from the community and information superhighway.

Therefore, for internet to provide the needed platform for learning to take place, there must be the right internet resources to render the services. There must also be good will on the part of users. If the users see it to be important to them, then they will drive full benefits them but if it is not seen to be important, users will not benefit from it. Again, internet use goes with certain challenges. If the challenges are too many confronting users, the benefits would be less but if the challenges are reduced to the barest minimum, users would benefit from. Hence from the literature reviewed above, internet is a very useful tool that can serve as a very good alternative to the traditional libraries in serving as a place where credible information can be obtained.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter is the third chapter of the study. It deals with the methodology of the study. The gives a vivid explanation of the types of research design used for the study. It also explains the reason for the choice, and the steps followed in choosing that type is also extensively dealt with. It further looks at population used for the study. Under the population, who the target population was, the population that were accessible to the researcher and the sample size used for the study are all dealt with. More so, it looks at the steps involved in selecting the participating Colleges, the steps involved in selecting the accessible pollution and how the participants were selected to take part in the research. The chapter further looks at the instrument that was used to collect data for the research, why the use of that instrument and how the instrument was used in collecting data for the research. Finally, this chapter discusses the data analysis procedure and brings to bare how the results obtained were analysed.

3.1 Research Design

The research design the researcher used for this study was survey. Survey can take many forms. Survey that seeks to take a snapshot of what is happening in a group at a particular time is known as cross- sectional survey. A survey can also carried out over time in a group to measure their behaviour or attitude. This type of survey is known as longitudinal survey. A survey may also seek to explore causal relationship between two or more variables (Mathers, Fox & Hunn, 2007). This is known as correlational survey.

I used survey for the following reasons:

Surveys have internal and external validity

Surveys are efficient to administer

Survey covers a geographically spread samples

Surveys have ethical advantages

Surveys are flexible to use.

The type of research survey design I used was the cross- sectional design. Since I needed to carry out at just one point in time of what was happening in the selected colleges at a particular time. According to Mathers, Fox and Hunn (2007), cross-sectional survey usually take a descriptive or exploratory form that simply sets out to describe behaviour or attitude. Since the study intended to find out the perception of the science student teachers of the use of internet at the College of Education at that particular time this type of survey was the most appropriate.

The main aim of this research is to find out whether science student teachers use internet in their studies. If they do how does it impact their learning of science. For this reason, information would have been sought from all the science student teachers in Ghana. However, since it will not be possible for the researcher to go to every College of Education for the data, the best thing was to get a representative sample that can represent the entire population and can still produce data that can be generalised. The researcher therefore selected three Colleges of Education in the Northern Region of Ghana to collect the data for the study. To achieve this, efforts were made to directly measure the effects of internet use of student teachers in all the Colleges under study. The results so obtained in this research was representative enough to guarantee generalisation of the findings.

There are forty- six (46) public Colleges of Education in Ghana. The research was done on College of Education students in Ghana. To conduct the research on all of them would not be practically possible. As such a representative sample needed to be used for the study. I then narrowed my scope to the northern region where I teach in one of the Colleges of Education. This was purposively done to enable the researcher to be able to travel around all the chosen Colleges of Education to administer and retrieve questionnaire.

There five (5) Colleges of Education in the Northern Region of Ghana. Out of this number, three (3) of them offer science as an elective programme. The other two (2) are non-science Colleges of Education. The researcher also purposively chose the science Colleges of Education because the target population were the level 100 science student teachers.

The use of the survey methods emphasizes quantitative research where data from a large organisations are collected through methods such as questionnaire, interviews or from published statistics, and these data are analysed using statistical techniques (Gable, 1994). Survey is the most elementary tool for all sorts of quantitative research techniques. Survey was used as a research design for the following advantages among others:

- It is relatively easy to administer
- Its instruments can be developed in less time as compared to other data collecting methods. Much time that would have been used to go round all Colleges to collect the data was saved in using survey.
- It is cost effective as compared to other types of research designs.

- It can be administered remotely via online, mobile devices, mail, telephone etc.
- It can be conducted remotely to reduce or prevent geographical dependence.
- The results obtained can be generalised and holds true for others but similar situations.

Research studies conducted have shown the merits, demerits and characteristics of quantitative research methods. Evidence abound indicates strongly that quantitative research is unique in nature. There is also enough literature supporting the fact that a combination of the two has an added advantage aside what each type will give. As such, this research work on survey used the quantitative method.

Quantitative method of research was used to be able to analyse the numbers of data collected and to represent the results pictorially. According to Crossman (2014), quantitative method is used to provide opportunities to the researcher to produce quantifiable and reliable data that can be generalised to the larger population. This therefore made it possible for the results to be presented in different forms for different category of readers to consume. This quantitative research was also used to allow the researcher to test the research questions with the help of statistical tools (Crossman, 2014). To Crossman (2014), quantitative research design has good qualities that makes it capable to explore the phenomena under discussion since the research can be elaborate in statistical modes including forms, tables and graphs.

3.2 Population

This research targeted all level 100 science student teachers in all the 46 Colleges of Education in Ghana. The target population involves all the possible participant who stand the chance of being selected. They involve those that qualify to take part in the research. My target population were all the science student teachers who admitted to all the College of Education all over the country.

The population that can be accessed by the researcher is known as the accessible population. My accessible population was the 175 science student teachers who were admitted to the three selected Colleges of Education in the Northern Region of Ghana. There were those that were available to me to take part in the research.

My sample size involved 60 participants from the three selected colleges of education in the Northern Region of Ghana out of 175. This constitutes 20 science student teachers from College 1, 20 science student teachers from College 2 and 20 science student teachers from College 3. These colleges were chosen because they were the Colleges in the Northern Region of Ghana who were offering pure science programmes. Their history in their performance in science is quite remarkable. Majority of the Colleges in Ghana are located at the south of the country hence makes sense to move out of those areas to select Colleges that could exhibit similar characteristics. They were also strategically chosen so that the results could easily be generalised.

Due to the scope of this research, the researcher made contacts with heads of department of the three Colleges of Education for the enrolment figures of their science student teachers. All the three Heads of department provided accurate data

timely to the researcher. The researcher constantly engaged the Heads of Department of the colleges and the participants to ensure that all are on the same page.

3.3 Sample and Sampling Procedure

Sampling is a procedure involved in choosing a group of respondents for a study in a way the individuals represent the larger group which they are carefully chosen from. The choice sample size has an effect on how the participants accurately represent the larger group.

The number of sample representing the populations is also paramount and can determine the way the results will turn out. According to Neuman (2007), for a population under 1000, a researcher needs a sample ratio of about 30%. The total population of the science student teachers in the three Colleges were 175. However, the nature of this research did not allow me to use all of them. There was therefore the need for me to get a representative population that I could use for the study. I then applied the 30% rule on the population of 175. This gave me 52.5 participants. The 52.5 participants could not give equal representation from each of the three selected Colleges. I then rounded the figure to 60 participants.

The researcher then used stratified random sampling technique to select participants to take part in the study. Stratified random sampling technique was used to get equal representation to express their opinions of the use of internet. Each College of Education was considered as a strata and a population of 20 participants was assign to it. This gave each of the three selected colleges 20 participants summing up to 60.

The researcher applied random sampling to get the participants from each College of Education. The list of all the science student teachers form each College were arranged in alphabetical order. Serial numbers were then assigned to them. So I had from one to the last number in each College. The numbers were then entered into a random number calculator. The calculator has a column for the number of participants required, in my case 20. You then indicate the minimum number which is one in my case. Then the maximum number which is the total number of science student teachers in every College. Then I indicated that numbers should not be repeated. Then instruction was then given for the random numbers to be generated. The first number was taken as the number one followed by the next to the twentieth (20th) number. This was repeated until I got the participants for every College. 20 questionnaire were sent to each College for students to respond to with 100% recovery rate anticipated.

Prior to the science student teachers being given the questionnaire the researcher sought permission from the Head of Department of science in each College to be given the chance to use the students for the study. The researcher then met the students personally to interact and familiarize with them. The researcher also told the science student teachers the purpose for the research and assured them of confidentiality of their identities. The student teachers were encouraged to respond to the questionnaire as objectively as practically possible. Again, timelines for the completion of the questionnaire were spelt out to prompt the student teachers to attempt the questionnaire promptly. The questionnaire was then distributed to the student teachers and two days were given for them to return them. After the two days, the researcher met them personally again to collect the completed questionnaire. This

was repeated for each college until all questionnaire were administered to all the three colleges. The researcher actually had 100% recovery from each college.

3.4 Research Instruments

The instrument used to collect data for this research was the questionnaire. The questionnaire was used because the research was carried out across three Colleges in the Northern Region of Ghana. Information was sourced from all the three Colleges with the aim of getting the sample that could be generally representative enough to be generalised. As such questionnaire was used as the instrument to gather data that could be relied upon to be the true reflection of the information for the research. Therefore, this research work used questionnaire as the main instrument for the data collection. The questionnaire was used to obtain primary data for the researcher to get to understand student teachers familiarity and usage of internet. Since the primary aim of the research was to find out the perception of science student teachers about the use of internet, questionnaire was the appropriate instrument that could be used for that purpose.

3.4.1 Questionnaire

Based on the research objectives and the literature reviewed, and because of its many advantages, a self- administered questionnaire on the student teachers perception of the use of internet on their academic performance in science was used. Questionnaire according to Borg (2003) is a very important tool to find out the viewpoint of individuals or the disposition of individuals towards a person, thing or idea. Since the views of the science student teacher were sought on their perception about the use of internet, it was necessary to use an instrument that could give an accurate measure exactly what it was supposed to measure and could be relied on to

give the same measure if it was used more than once. The data collected needed to be analysed before any meaning could be drawn from it. The researcher therefore used the instrument that could easily be analysed. Hence the questionnaire. According to Tariq (2016), questionnaire enables data analysis to be easy unlike interviews and observations which are a bit difficult to analyse. The researcher therefore used questionnaire as an instrument to get detailed information on student teachers perception of the use of internet on their academic performance in science to be able to obtain data that could easily be analysed.

The questionnaire that was used for the collection of data for this research was adapted from Tariq (2016) but modified for the purpose of this work. The instrument perfectly fell into the structure of this work. It marched very well with the research objectives of this work. It however needed to be modified to suit the objectives and research questions of the researcher.

The questionnaire was divided into five sections, thus;

1. types of internet resources
2. importance of internet services
3. effective use of internet resources
4. effects of internet use on student teachers academic performance
5. challenges student teacher face in using internet resources

In section A, information on types of internet resources were included. Information regarding eBooks, journals, thesis and institutional websites, mailing groups, workshops, library catalogue, digital library and others were requested from student teachers.

Section B looked at the importance of internet resources to science student teachers. Here, the researcher wanted to find out how important those internet resources were to the science student teachers. e- Books, magazines, mailing groups, journals among others were presented to student teachers to select.

Section C dealt with effective use of internet by student teachers. Areas information were required were access to internet resources, availability of internet resources, types of internet tools, information seeking behaviours of student teachers and student teachers satisfaction level regarding internet.

To find out the effect of internet use on student teachers academic performance, section D looked at the purpose of student teachers use of internet resources, objectives, frequency of use, ranking to the use of internet and advantages student teachers drive from internet use,

In the final section, section E, challenges to the use of internet were dealt with. All the possible challenges to the use of internet resources were required from student teachers.

When the reliability of the instrument was ascertained, it was administered to the participants. The researcher personally travelled from one College to another to administer the questionnaire. Fifty- five (55) questionnaires were distributed to students in each College to respond to. The researcher met all the students as a class to introduce himself to them and to seek their consent to respond to the questionnaire. The researcher had to stay for two days in each College to allow the respondents the ample time to respond to the questionnaire. After two days, the researcher met all the students again as a class to retrieve the questionnaire. The researcher also thanked the

participants for their time and for responding objectively to the questionnaire. The questionnaire were then prepared for analysis and interpretation.

3.4.2 Validity

The aim of the researcher was to get a data that could be seen to authentic credible. To ensure the validity of the instrument, it was subjected to both face and content validity.

Face validity

The instrument needed to measure exactly what it intended to measure. To ensure this, the instrument was subjected to face validity test. This afforded the researcher the opportunity to use a very credibly instrument to collect the data. When the draft questionnaire was ready, some student teachers were made to read through them to find out if the questions were well understood by them. Those that were seen to be ambiguous were reframed. The questionnaire was then pilot tested on student teachers with similar characteristic. College 4 is also a science college and the student teachers have the same characteristics as the participants, it made sense for the instrument to be tested on them. Through the pilot testing, some items of the questionnaire were rephrased and sequenced to make it a comprehensive tool for collection of data. The pretesting also afforded the researcher the opportunity to fine-tune the design and methodology for the research.

Content Validity

The draft questionnaire was presented to a senior colleagues for their views and approval before it was used. They checked the content of the questionnaire in line with the research objectives and research question. The questions that they felt were out of place were either modified or removed. Other senior researchers including

library professionals and IT experts were consulted to get their views on the items on the questionnaire. The feedback were incorporated into the questionnaire and helped the researcher to use questionnaire with very high validity.

3.4.3 Reliability

The questionnaire needed to be reliable in order to produce the desired results. It was therefore subjected to Cronback's Alpha test for its reliability. After the pilot test, the data was entered into SPSS and subjected to statistical analysis. A cronback's alpha coefficient was generated. The coefficient of the Cronback's Alpha was 0.84 indicating a high internal consistency. The Cronback's Alpha test revealed that the reliability of the instrument had a high internal consistency.

3. 4.4 Ethical Considerations

In conducting a research, ethical issues are very important things to consider. This was taken seriously in this research because it boarded on the personality of individuals. The reputation of the individuals that were to respond to the questionnaire were considered paramount in carrying out this research. The participants were from diverse backgrounds. There were actually some of the participants who never own a smartphone nor operate a computer before. Such participants' reputation needed to be protected and kept as confidential as possible.

The researcher met all the participants before they were given the questionnaire. At that meeting all the participants were assured that their anonymity and confidentiality would be assured. All of them were made to understand that no would get to know the response anyone of them gave about their perception on the use of internet.

More so, the questionnaire had an introductory message on it. The introduction further assured participants of confidentiality. The introduction made it clear that the responses the student teachers were to give were for research purposes only and would not be used for anything else. That allayed the fears of the participants and they responded objectively the items in the questionnaire.

3.5 Data Collection Procedure

The researcher adapted and modified questionnaire from Tariq (2016). The questionnaire was first of all modified to suit the research objectives of the researcher. Some colleagues were then consulted to ascertain the content validity of the test. The instrument was also tested for its face validity. After the pilot test of the instrument the data was entered into SPSS for analysis and to test for the reliability using Cronback's alpha. The value for Cronback's alpha ccoefficient turned as 0.84. This was an indication that the instrument was very reliable.

When the validity and reliability was ascertained, the researcher then personally moved from one College to another to administer the questionnaire himself. The researcher did self-administration of the question to ensure that there was 100% recovery. The questionnaire were personally sent to the science student teachers by the researcher himself. After the student teachers responded to the questionnaire, the researcher retrieved them and did the analysis.

3.6 Data Analysis

The data collected came in two different forms; questionnaire, and students' end of semester examination results. The information was not handy and so required to be simplified to be able to make meaning out of. In this light, the different

instruments were subjected to quantitative analysis using SPSS and Excel spread sheets.

When all the questionnaire were administered and retrieved, the researcher entered it into the SPSS to codify it. Then the necessary statistical tools were applied to produce results that could be analysed. The results appeared as numbers and percentages. The numbers and percentages were what the researcher used to do the analysis.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Overview

This is the chapter four of the research work. In this chapter, the results and discussions are presented here. The data was obtained from three Colleges in the Northern Region. Three Colleges of Education were sampled for this study. In all, 60 science student teachers were sampled to take part in the research. A total of 20 science student teachers were selected from each college to respond to the questionnaire. The data collected as well as the test results of the science student teachers are therefore presented here in this chapter and the analysis done on them.

In this chapter, the analysis is based on the research questions. Each research question was taken and the data under it was presented and analysed. The data then showed whether the research question is answered or not. In the analyses, the researcher is always guided by the theory behind the research work, which is the sociocultural learning theory proposed by Lev Vygotsky.

The analysis of the data is done College by College. This is done to see clearly how the science student teachers responded to the questionnaire in each College and how they fared in the examinations. It is also done to be able to compare the means of the Colleges and to see if the results are similar and can be generalised. Details of these are presented below.

Research Question 1: Which types of internet tools do science student teachers use in searching for information for their studies in the Colleges of Education in Northern Region?

Type of internet tools science student teachers use

Table 1a presents data on research question 1. This sought to answer which types of internet tools science student teachers used. This was the data obtained in the first College of Education. The internet tools that were identified were journals, online library catalogues, electronic books, workshops/seminars, reports, social network sites, research repository, magazines, mailing groups and social media platforms. In all, the respondents had options of personal subscription, institutional subscription, free access and not available to choose from. Table 1a is as presented.

Table 1a: Science student teachers internet access mode at College 1

	Personal Subscription	**Institutional Subscription**	**Free Access**	**Not Available**
Journals	0 (0%)	9 (45%)	7 (35%)	4 (20%)
Online Library catalogues	0 (0%)	9 (45%)	6 (30%)	5 (25%)
Electronic Books	0 (0%)	12 (60%)	7 (35%)	1 (5%)
Workshops/Seminars	0 (0%)	12 (60%)	5 (25%)	3 (15%)
Reports	0 (0%)	13 (65%)	3 (15%)	4 (20%)
Social network sites, i.e.; blogs,	0 (0%)	10 (50%)	6 (30%)	4 (20%)
Research repository	0 (0%)	12 (60%)	3 (15%)	5 (25%)
Magazines	0 (0%)	13 (65%)	1 (5%)	6 (30%)
Mailing groups	0 (0%)	12 (60%)	3 (15%)	5(25%)
Social media platforms, i.e.; Facebook, WhatsApp	20 (100%)	0 (0%)	0 (0%)	0 (0%)

Source: Field Data, January and February 2021

Data obtained showed strong indication that science student teachers relied heavily on the institutional subscription for access to online services for their academic work. In all the categories, there was no indication that science student teachers obtained information through their personal subscription. This can be seen in Table 1a. However, all the participants indicated that they used social media platforms through their own subscription. Again, 45% to 65% of the participants in College 1 indicated that institutional subscription granted them access to internet services unlike social media platforms. This is clearly shown in the Table 1a above. Participants also got access to internet via the free access points. As can be seen on the table above, as high as 35% of the participants' access journals and electronic books through the free access mode. It is instructive to note that some participants are not able to access as some of them actually indicated that those internet services are not available to them. Except social media platforms, from 5% to 30% of the science student teachers showed that the internet services are not available to them. This explains why some science student teachers do not use internet to access information for their academic work.

From the results in Table 1a, it can be seen clearly that the science student teachers' main source of getting access to the internet is either the institutional subscription or the free access portals. Students do not find it worthwhile to use their money to subscribe to get access to the internet for their studies. However, they can use their smartphones to download the social media apps to chat as is shown in the table above. This confirms what some researchers have found in their work that most college students once sat in front of computer to use chat tools (Yu, 2012). This goes to prove that college students using internet rather use it to chat instead of academic purposes.

Another point that is interesting and worth mentioning is the fact that students will not make any effects at all to use the internet but only relying on the fact that internet is not available to them. This group of students do not care to search for information from the internet, and hence, feel that what they are looking for cannot be found in either the free access points or the institutional subscription portals. This group of students will rather use the traditional libraries than use the internet.

Type of internet tools science student teachers use

Table 1b presents data on research question 1. This sought to answer which types of internet tools science student teachers used. This was the data obtained in the second College of Education. The internet tools that were identified were journals, online library catalogues, electronic books, workshops/seminars, reports, social network sites, research repository, magazines, mailing groups and social media platforms. In all, the respondents had options of personal subscription, institutional subscription, free access and not available to choose from. Table 1b is as presented.

Table 1b: Science student teachers internet access mode at College 2

	Personal Subscription	Institutional Subscription	Free Access	Not Available
Journals	0 (0%)	12 (60%)	6 (30%)	2 (10%)
Online Library catalogues	0 (0%)	12 (60%)	6 (30%)	2 (10%)
Electronic Books	0 (0%)	10 (50%)	7 (35%)	3 (15%)
Workshops/Seminars	0 (0%)	12 (60%)	5 (25%)	3 (15%)
Reports	0 (0%)	11 (55%)	5 (25%)	4 (20%)
Social network sites, i.e.; blogs, wikis etc.	0 (0%)	13 (65%)	5 (25%)	2 (10%)
Research repository	0 (0%)	14 (70%)	2 (10%)	3 (15%)
Magazines	0 (0%)	14 (70%)	1 (5%)	5 (25%)
Mailing groups	0 (0%)	12 (60%)	3 (15%)	5 (25%)
Social media platforms, i.e.; Facebook, WhatsApp etc.	20 (100%)	0 (0%)	0 (0%)	0 (0%)

Source: Field Data, January and February 2021

In Table 1b, the situation was not entirely different from Table 1a. Twelve (12) out of the 20 students representing 60% and 6 out of the 20 students representing 30% of the participants in that College believe they get access to journals and online libraries through institutional subscription and free access respectively. Again, 10% of the students indicated that journals and online libraries are not available to them. On research repository and magazines, 70% of the students said they were available on institutional subscription and 10% and 5% indicating their availability on free access with 15% and 25% of them saying they were not available. Like in College, the College 2 science student teachers indicated the availability of social media platforms only on personal subscription. There is also a strong agreement of the internet services availability at College 2 on institutional as well as free access as can be seen in Table 1b.

Type of internet tools science student teachers use

Table 1c presents data on research question 1. This sought to answer which types of internet tools science student teachers used. This was the data obtained in the third College of Education. The internet tools that were identified were journals, online library catalogues, electronic books, workshops/seminars, reports, social network sites, research repository, magazines, mailing groups and social media platforms. In all, the respondents had options of personal subscription, institutional subscription, free access and not available to choose from. Table 1c is as presented.

Table 1c: Science student teachers internet access mode at College 3

	Personal Subscription	Institutional Subscription	Free Access	Not Available
Journals	0 (0%)	12 (60%)	6 (30%)	2 (10%)
Online Library catalogues	0 (0%)	11 (55%)	7 (35%)	2 (10%)
Electronic Books	0 (0%)	11 (55%)	7 (35%)	2 (10%)
Workshops/Seminars	0 (0%)	13 (65%)	5 (25%)	2 (10%)
Reports	0 (0%)	11 (55%)	5 (25%)	4 (20%)
Social network sites, i.e.; blogs, wikis etc.	0 (0%)	13 (65%)	5 (25%)	2 (10%)
Research repository	0 (0%)	13 (65%)	3 (15%)	4 (20%)
Magazines	0 (0%)	14 (70%)	1 (5%)	5 (25%)
Mailing groups	0 (0%)	11 (55%)	3 (15%)	6 (30%)
Social media platforms, i.e.; Facebook, WhatsApp	20 (100%)	0 (0%)	0 (0%)	0 (0%)

Source: Field Data, January and February 2021

In Table 1c, high numbers showed the availability of internet services on either institutional subscription or free access. The data obtained also showed that some science student teachers also believe that the internet services were not available them. In the case of mailing groups and magazines, 6 out of the 20 students and 5 out of the 20 students respectively who took part in the questionnaire really believed that those services were not available to them. Again, all the students indicated that social media platforms were available to them on their personal subscriptions. It can be understood that any smartphone can be used to download the social media platforms applications without necessarily relying on any source for its usage. Table 1c show the responses of science student teachers on the accessibility of internet services at College 3.

Research Question 2: Which types of internet resources do Science Student Teachers use in searching for information for their studies in the Colleges of Education?

Importance of internet resources to students

Table 2a presents data on the type of internet resources science student teachers use for information. This answered research question 2. The internet tools that were identified were journals, online library catalogues, electronic books, workshops/seminars, reports, social network sites, research repository, magazines, mailing groups and social media platforms. The student teachers were to respond by choosing very important, important, some important, not important or don't know.

Data related to the types of internet resources that can improve student teachers academic improvement is presented in Table 2a for College 1.

Table 2a: Importance of internet resources students

	Very important	Important	Some Important	Not important	Don't Know
Journals	8 (40%)	7 (35%)	3 (15%)	0 (0%)	2 (10%)
Online Library catalogues	9 (45%)	3 (15%)	4 (20%)	0 (0%)	4 (20%)
Electronic Books	11(55%)	5 (25%)	2 (10%)	0 (0%)	2 (10%)
Workshops/Seminars	12 (60%)	5 (25%)	1 (5%)	0 (0%)	2 (10%)
Reports	11 (55%)	3 (15%)	2 (10%)	1 (5%)	3 (15%)
Social network sites, i.e.; blogs, wikis etc.	12 (60%)	4 (20%)	1 (5%)	1 (5%)	2 (10%)
Research repository	11 (55%)	6 (30%)	1 (5%)	0 (0%)	2 (10%)
Magazines	8 (40%)	6 (30%)	4 (20%)	0(0%)	2 (10%)
Mailing groups	8 (40%)	4 (20%)	4 (20%)	1 (5%)	3 (15%)
Social media platforms, i.e.; Facebook, WhatsApp etc.	14(70%)	2 (10%)	3 (15%)	0 (0%)	1 (5%)

Source: Field Data, January and February 2021

On the type of internet services available to College 1, science student teachers, data indicates that student teachers were aware of the resources available to them and their importance. 8 science student teachers representing 40% and 7 student teachers representing 35% felt journals were very important and important respectively. They actually believe that the resources were of importance to them because 0% indicated not important with 2 student teachers represent 10% not too certain about its importance as indicated in Table 2a.

On the issue of Online Library catalogues 9, 3 and 4 science student teachers representing 45%, 15% and 20% showed that it was very important, important and

somehow important respectively to them. No student thought it was not important but 20% of the students were not sure of its importance. This is presented in Table 2a.

In Table 2a, electronic books, workshops/ seminars, reports, social network sites, magazines and mailing groups equally were generally acclaimed to be important to science student teachers at College 1. Only a few of them really believed they were not important to them. A few others were also undecided on their importance to them. As many as 14 science student teachers from the College representing 70% knew social media was very important to them. Ten percent and 15% still believe social media is important, and somehow important respectively to them academically with just 5% uncertain about that.

Importance of internet resources to students

Table 2b presents data on the type of internet resources science student teachers use for information. This answered research question 2. The internet tools that were identified were journals, online library catalogues, electronic books, workshops/seminars, reports, social network sites, research repository, magazines, mailing groups and social media platforms. The student teachers were to respond by choosing very important, important, some important, not important or don't know.

Data related to the types of internet resources that can improve student teachers academic improvement is presented in Table 2b for College 2.

Table 2b: Importance of internet resources to students

	Very important	Important	Some Important	Not important	Don't Know
Journals	11 (55%)	6 (30%)	2 (10%)	0 (0%)	1 (5%)
Online Library catalogues	12 (60%)	3 (15%)	2 (10%)	1 (5%)	2(10%)
Electronic Books	12 (60%)	5 (25%)	0 (0%)	2 (10%)	1 (5%)
Workshops/Seminars	11 (55%)	3 (15%)	3 (15%)	2 (10%)	1 (5%)
Reports	11 (55%)	3 (15%)	2 (10%)	1 (5%)	3 (15%)
Social network sites, i.e.; blogs, wikis etc.	15 (75%)	0 (0%)	3 (15%)	1(5%)	1(5%)
Research repository	10 (50%)	4 (20%)	1 (5%)	1 (5%)	4(20%)
Magazines	9 (45%)	4 (20%)	2 (10%)	4 (20%)	1 (5%)
Mailing groups	10 (50%)	4 (20%)	4 (20%)	1(5%)	1 (5%)
Social media platforms, i.e.; Facebook, WhatsApp etc.	13 (65%0	4 (20%)	2 (10%)	1 (5%)	0(0%)

Source: Field Data, January and February 2021

As shown in Table 2b, data obtained for the College 2 group also showed strong indication of science student teachers' beliefs in the importance of internet resources to student teachers. Social network sites and social media platforms registered 75% and 65% respectively indicating that science student teachers are very much aware of their importance to the academic performance of the students. Again, 15% and 20% of the science student teachers did not know the importance of reports and research repository respectively. This is an indication that they do not use internet in their search for information for their academic work. From Table 2b, it can be seen that a good number of the science student teachers representing 45% to 65% further showed that student teachers knew the importance of internet resources to them. A

few of them thought the internet was not important to them as 20% and 10% of the students thought magazines and electronic books and workshops respectively were not important to their studies.

Importance of internet resources to students

Table 2c presents data on the type of internet resources science student teachers use for information. This answered research question 2. The internet tools that were identified were journals, online library catalogues, electronic books, workshops/seminars, reports, social network sites, research repository, magazines, mailing groups and social media platforms. The student teachers were to respond by choosing very important, important, some important, not important or don't know.

Data related to the types of internet resources that can improve student teachers academic improvement is presented in Table 2c for College 3.

Table 2c: Importance of internet resources to students

	Very important	Important	Some Important	Not important	Don't Know
Journals	15 (75%)	2 (10%)	2 (10%)	1 (5%)	0 (0%)
Online Library catalogues	11 (55%)	2 (10%)	3 (15%)	2 (10%)	2 (10)
Electronic Books	7 (35%)	8 (40%)	2(10%)	1 (5%)	2 (10%
Workshops/Seminars	11 (55%)	2 (10%)	4 (20%)	1 (5%)	2 (10%)
Reports	12 (60%)	2 (10%)	4 (20%)	0 (0%)	3 (15%)
Social network sites, i.e.; blogs, wikis etc.	12 (60%)	4 (20%)	1 (5%)	1 (5%)	2 (10%)
Research repository	10 50%)	5 (25%)	3 (15%)	0 (0%)	2 (10%)
Magazines	6 (30%)	6 (30%)	5 (25%)	0 (0%)	3 (15%)
Mailing groups	8 (40%)	4 (20%)	6 (30%)	0 (0%)	2(10%)
Social media platforms, i.e.; Facebook, WhatsApp etc.	13 (65%)	3 (15%)	2 (10%)	0 (0%)	2(10%)

Source: Field Data, January and February 2021

The case is not too different from College 3 as shown in Table 2c. Data obtained shows that internet resources were important to them as shown in Table 2c. As many as 15 out of the 20 science student teachers representing 75% in that College believed strongly that journals were very important to them. Again, 13 out the 20 science student teacher in College 3 representing 65% also believed that social media was of immense importance them. It is instructive to note that a few of the student teachers also did not see the importance of internet resources to them with some also undecided on that issue.

Data obtained from the three Colleges agreed strongly. The science student teachers knew the importance of internet resources to them as can be seen in Tables 2a, 2b and 2c.

Research Question 3: What are the advantages of science student teachers use of internet on their academic performance in science in the Colleges of Education in the northern region?

Advantages of internet to science student teachers

Table 3 presents data on the advantages of internet use to science student teachers. This provided an answer to research question 3. The advantages that students teachers were to choose from were; multiple choice format, fast access, multiple user access, easily accessible at any place, access to wide range of information, quick retrieve ability, updated resources, mostly resources are freely accessible, full text searching, links to other resources, multimodality and readable on mobile/ portable devise. The science student teachers were in; strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. The data is as presented in Table 3a for College 1.

Table 3a: Advantages of internet to science student teachers at College 1

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Multiple choice formats	12 (60%)	4 (20%)	3 (15%)	1 (5%)	0 (0%)
Fast access	12 (60%)	4 (20%)	4 (20%)	0 (0%)	0 (0%)
Multi user access	12 (60%)	5 (25%)	3 (15%)	0 (0%)	0 (0%)
Easily accessible at any place	12 (60%)	5 (25%)	3 (15%)	0 (0%)	0 (0%)
Access to wide range of information	12 (60%)	5 (25%)	3 (15%)	0 (0%)	0 (0%)
Quick retrieve ability	12 (60%)	4 (20%)	4 (20%)	0 (0%)	0 (0%)
Updated resources	11 (55%)	4 (20%)	4 (20%)	1 (5%)	0 (0%)
Mostly resources are freely accessible	10 (50%)	4 (20%)	4 (20%)	2 (10%)	0 (0%)
Full text searching	12 (60%)	3 (15%)	5 (25%)	0 (0%)	0 (0%)
Links to other resources	13 (65%)	3 (15%)	4 (20%)	0 (0%)	0 (0%)
Multimodality (text, audio, visual etc.)	12 (60%)	3 (25%)	4 (20%)	1 (5%)	0 (0%)
Readable on Mobil/portable devises	12 (60%)	5 (25%)	3 (15%)	0 (0%)	0 (0%)

Source: Field Data, January and February 2021

The advantages of internet services on the academic performance of science student teachers cannot overemphasized. As can be seen from Table 5a, there was a general agreement on the part of science student teachers at College 1 about the advantages of internet to them. On the multiple choice formats of internet resources, 60% of the students at College 1 strongly agreed, 20% of them also agreed with 15% of them undecided on that issue. However, 5% disagreed to it being advantageous. On

the issue of the internet giving fast information, 60% of them agreed strongly, 20% agreed and 20% of them were undecided. In similar fashion, there is strong agreement in other categories as can be seen from the high numbers on the table 5a. Only a few of them were undecided with very small numbers disagreeing.

On the issue of internet allowing full text search, 60% and 15% of the students strongly agreed and agreed respectively. It is seen that the students believe in the internet as it can allow them the chance to search for a full text instead of getting it bit. The students feel is good that way because only 25% of them neither agreed nor disagreed with no one disagreeing.

Advantages of internet to science student teachers

Table 3 presents data on the advantages of internet use to science student teachers. This provided an answer to research question 3. The advantages that students teachers were to choose from were; multiple choice format, fast access, multiple user access, easily accessible at any place, access to wide range of information, quick retrieve ability, updated resources, mostly resources are freely accessible, full text searching, links to other resources, multimodality and readable on mobile/ portable devise. The science student teachers were in; strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. The data is as presented in Table 3a for College 2.

Table 3b: Advantages of internet to science student teachers at College 2

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Multiple choice formats	12 (60%)	6 (30%)	4 (20%)	0 (0%)	0 (0%)
Fast access	11 (55%)	6 (30%)	4 (20%)	1 (5%)	0 (0%)
Multi user access	12 (60%)	5 (25%)	3(15%)	0 (0%)	0 (0%)
Easily accessible at any place	12 (60%)	5 (25%)	3 (15%)	0 (0%)	0 (0%)
Access to wide range of information	11 (55%)	5 (25%)	4 (20%)	0 (0%)	0 (0%)
Quick retrieve ability	12 (60%)	5 (25%)	4 (20%)	0 (0%)	0 (0%)
Updated resources	11 (55%)	6 (30%)	3 (15%)	0 (0%)	0 (0%)
Mostly resources are freely accessible	13 (65%)	5 (25%)	2 (10%)	0 (0%)	0 (0%)
Full text searching	12 (60%)	5 (25%)	3 (15%)	0 (0%)	0 (0%)
Links to other resources	11 (55%)	5 (25%)	3 (15%)	0 (0%)	0 (0%)
Multimodality (text, audio, visual etc.)	11 (55%)	4 (20%)	3 (15%)	0 (0%)	0 (0%)
Readable on Mobil/portable devises	12 (60%)	4 (20%)	4 (20%)	0 (0%)	0 (0%)

Source: Field Data, January and February 2021

In Table 3b, science student teachers also showed strong agreement to the advantages of internet resources to them. High percentages ranging from 55% to 60% strongly agreed to the advantages with 20% to 30% also agreeing to them. However, from 10% to 20% of the students neither agreed nor disagreed to the various categories with just 5% of the students disagreeing to the advantages of internet giving fast access. Table 3b shows the numbers and percentages of the science student teachers agreement or otherwise to internet services.

Advantages of internet to science student teachers

Table 3 presents data on the advantages of internet use to science student teachers. This provided an answer to research question 3. The advantages that students teachers were to choose from were; multiple choice format, fast access, multiple user access, easily accessible at any place, access to wide range of information, quick retrieve ability, updated resources, mostly resources are freely accessible, full text searching, links to other resources, multimodality and readable on mobile/ portable devise. The science student teachers were in; strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. The data is as presented in Table 3c for College 3.

Table 3c: Advantages of internet to science student teachers at College 3

	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
Multiple choice formats	12 (60%)	6 (30%)	2 (10%)	1 (5%)	0 (0%)
Fast access	18 (90%)	0 (0%)	1 (5%)	1 (5%)	0 (0%)
Multi user access	12 (60%)	4 (20%)	2 (10%)	2 (10%)	0 (0%)
Easily accessible at any place	12 (60%)	3 (15%)	3 (15%)	2 (10%)	0 (0%)
Access to wide range of information	13 (65%)	3 (15%)	3 (15%)	1 (5%)	0 (0%)
Quick retrieve ability	12 (60%)	4 (20%)	3 (15%)	1 (5%)	0 (0%)
Updated resources	10 (50%)	5 (25%)	5 (25%)	0 (0%)	0 (0%)
Mostly resources are freely accessible	11 (55%)	5 (25%)	3(15%)	1 (5%)	0 (0%)
Full text searching	12 (60%)	5 (25%)	3 (15%)	0 (0%)	0 (0%)
Links to other resources	11 (55%)	5 (25%)	4 (20%)	0 (0%)	0 (0%)
Multimodality (text, audio, visual etc.)	12 (60%)	4(20%)	4 (20%)	0 (0%)	0 (0%)
Readable on Mobil/portable devises	13 (65%)	4 (20%)	3 (20%)	0 (0%)	0 (0%)

Source: Field Data, January and February 2021

In Table 3c, Ninety percent (90%) of respondents in College 3 strongly agreed that internet offer fast access to information. Again, 65% of the respondents in that College strongly agreed that internet services offers information on portable devices, access to wide range of information. More so, there was a high agreement in the other categories as well. However, few respondents did not agree nor disagree to the advantages of the internet in terms of the categories presented. Very few of them also disagreed to the advantages of internet to them. 60% of the students believed strongly that internet presented quick retrieval ability them a good platform for information on their studies. To them because the quickly get information from the internet makes it advantageous.

As could be observed in Table 3c, on the multiple choice format of the internet, 60% 30% of the students strongly agreed and greed respectively to it. 10% of them neither agreed nor disagreed. This consistent with research available on that subject. Again, on multi user access, 60% and 20% respectively strongly agreed and agreed to its advantages. 10% of them each neither agreed nor disagreed and disagreed. It is seen that even though some of the students see the fact that internet presents a platform where many users can get access to it at the same time, some were not aware of that. They are either not familiar with the internet of they have not really taken their time to study the feature of it.

Accessibility of internet resources

The science student teachers were to indicate how long they have been using internet. The options were one to four months, five to eight months and above nine months. The responses in numbers and percentages is presented in Table 4a for the three selected Colleges.

Table 4a: The length of time science student teachers have been using internet

	1- 4 Months	5- 8 Months	Above 9 Months
College 1	1 (5%)	0 (0%0	19 (95%)
College 2	2 (10%)	0 (0%)	18 (90%)
College 3	3 (15%)	0 (0%)	17 (85%)

Source: Field Data, January and February 2021

Concerning the length of time science student teachers have been using internet, the data shows that they have been using it for long. As indicated in Table 4a, College 1 science students have been using internet even before gaining admission into the College. Nineteen (19) out of the 20 participating students in this research representing 95% indicated that they have been using internet above 9 months. This is not entirely different from the data collected from science student teachers from College 1 and College 3. 90% and 85% of the students of College 2 and College 3 respectively indicated that they have been using internet over 9 months. Again, 5%, 10% and 15% of the students in College 1, College 2 and College 3 respectively indicated that they have been using internet between 1 and 4 months. This is an indication that they only started using internet since they gained admission into the Colleges and may not be too conversant with internet usage. However no student indicated that they have used it between 5 and 8 months.

Science student teachers feeling during their first time of internet usage

In table 4b, science student teachers were to indicate their feeling for using the internet for the first time. The student teachers were to indicate whether its usage was exciting, not exciting and boring.

Table 4b: Science student teachers first experience in using internet

	Exciting	Not Exciting	Boring
College 1	15 (75%)	5 (25%)	0 (0%)
College 2	16 (80%)	4 (20%)	0 (0%)
College 3	15 (75%)	5 (25%)	0 (0%)

Source: Field Data, January and February 2021

Science student teachers first experience with the internet was exciting. 15 (75%), 16 (80%) and 15 (75%) of the science student teachers from College 1, College2, and College 3 respectively found internet exciting during the first experience. The data also showed that 5 (25%), 4 (20%) and 5 (25%) from, College 1 College 2 and College 3 respectively did not find internet exciting. No student from the three Colleges however found internet boring.

Science student teachers reason for internet use

The science student teachers were asked to indicate their reasons for using internet. They had to indicate whether their usage was academic, social media or others. The results is presented in Table 4c.

Table 4c: Science student teachers reasons for using internet

	Academic	Social Media	Others
College 1	4 (20%))	16 (80%)	0 (0%)
College 2	6 (30%)	14 (70%)	0 (0%)
College 3	7 (35%)	13 (65%)	0 (0%)

Source: Field Data, January and February 2021

From Table 4c, it can be seen that student teachers reason for using internet points strongly to social media. 80% of the science student teachers in College 1 showed that they mainly used internet for social media and only 20% of used it for academic purposes. In College 2, 70% used internet for social media and 30% used it for academic work. Again, 65% of the participants in College 3 used internet for

social and 35% used it for academic work. Aside the two, no other indication was shown for the use of internet by the participants in all the three Colleges that took part in the research. This clearly shows that science student teachers only used internet for purposes of chatting in social media and academic work. This strongly agrees with research conducted by others.

The science student teachers feeling of the useful of the internet

The Table 4d presents results for science student teachers feeling of the usefulness of the internet. The participants were to show whether the found it useful as compared to their previous usage, the same as before or not useful.

Table 4d: Science student teachers of feeling of usefulness of internet services

	Useful	Same as Before	Not Useful
College 1	18 (90%)	0 (0%)	2 (10%)
College 2	17 (85%)	0 (0%)	3 (15%)
College 3	18 (90%)	0 (0%)	2 (10%)

Source: Field Data, January and February 2021

Internet services was found to be useful as shown in Table 4d. High numbers of 18, 17 and 17 of science student teachers from College 1, College 2 and College 3 respectively found internet services useful. The data indicates that science student teachers know of the usefulness of internet services as such rely on it to source information for their academic work as well as their social interaction. However, 2 science student teachers from College 1, 3 science student teachers from College 2 and 2 science student teachers from College 3 found internet not useful. To this group of student teachers, the traditional libraries can best serve them than the internet. This can be seen that science student teachers after their first experience found the internet useful but a few of them too would still not see it as useful as the others had seen.

Again, none of the students from any of the Colleges thought indicated they had the same experience when using internet for their studies as their first time. The students either believe internet were useful to them or not useful.

Science student teachers place access to internet services

The science student teacher were asked where they usually get their internet services from. They had the dormitory, school compound and library to choose from. Table 4e presents results for the student teachers place of access to internet.

Table 4e: Science student teachers place of access to internet services

	Dormitory	School	Library
College 1	2 (10%)	20 (100%)	4 (20%)
College 2	4 (20%)	20 (100%)	5 (25%)
College 3	4 (20%)	20 (100%)	3 (15%)

Source: Field Data, January and February 2021

Science student teachers in all the Colleges under consideration access internet services mainly from the college campus. From Table 4e, the research found that all the participants were of the view that they can get access to internet when they are on the colleges' campuses. A few others also believe they access the internet in the dormitory with the rest holding the view that they can access internet in the library. The research found that the internet is strong especially around the classes' areas, library and weak at the dormitories. That accounts for science student teachers only getting full access to the internet only at the classes' area and in some cases at the library.

Search engines science student teachers use

Four search engines were presented to the science student teachers to indicate which of them they used to search for information. The engines presented to the students were online websites, library web portals, web search engines and social media. The results is as presented in Table 4f.

Table 4f: Search Engines Student Teachers Use

	Online Websites	Library	Web Portals	Web Search Engines	Social Media
College 1	0 (0%)		2 (10%)	20 (100%)	2 (10%)
College 2	0 (0%)		0 (0%)	20 (100%)	2 (10%)
College 3	0 (0%)		0 (0%)	20 (100%)	5 (25%)

Source: Field Data, January and February 2021

The appropriate choice of the search engine goes a long way to determine how effectively internet is used. Data obtained on science student teachers' choice of search engines turned out to be interesting. Hundred percent (100%) of the students in each College indicated that they use web engines as shown in Table 4f. Again, 2 students representing 10% in both College 1 and College 2 chose social media as a useful search engine. 5 student teachers from College3 representing 25% however chose the social media. On web portals, only 2 students from College1 representing 10% used it to search for information. No student from College2 and College3 used web portals. No student from all the Colleges also used online library websites for information.

Research Question 4: What challenges do science student teachers face in using internet in the Colleges of Education in the northern region?

Challenges science student teachers face in using internet resources

On the challenges science student teachers faced in using the internet, a number challenges were identified. The challenges were; lack of computer facilities in the Colleges, power failure, slow internet connectivity, non- connectivity, inability to use computer, inability to find relevant information, lack of information about how to use internet resources, lack of time acquire the skill to use internet resources, lack of support from the IT department, less resources available to your subject area and health constraints. The science student teachers were to show their agreement or otherwise. The options were; strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. Table 6a presents results for College 1

Table 6a: Challenges to the use of internet by Science Student Teachers College 1

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Lack of computer facilities in the COE	11 (55%)	3 (15%)	1 (5%)	7 (35%)	0 (0%)
Power failure	7 (35%)	6 (30%)	5 (25%)	1 (5%)	1 (5%)
Slow internet connectivity	12 (60%)	3 (15%)	3 (15%)	1 (5%)	1 (5%)
Non- connectivity	8 (40%)	5 (25%)	5 (25%)	2 (10%)	0 (0%)
Inability to use computer	2 (10%)	3 (15%)	0 (0%)	5 (25%)	10 (50%)
Inability to find relevant information	5 (25%)	3 (15%)	3 (15%)	2 (10%)	7 (35%)
Lack of information about how to use internet resources	7 (35%)	7 (35%)	2 (10%)	2 (10%)	2 (10%)
Lack of time to acquire skills to use internet resources	4 (20%)	3 (15%)	3 (15%)	4 (20%)	6 (30%)
Lack of support from the IT department	12 (60%)	5 (25%)	0 (0%)	3 (15%)	0 (0%)
Less resources available to your subject area	3 (15%)	3 (15%)	3 (15%)	4 (20%)	8 (40%)
Health constraints	8 (40%)	6 (30%)	2 (10%)	3 (15%)	1 (5%)

Source: Field Data, January and February 2021

There is no doubt that the use of internet presents certain challenges to its users. Data obtained from respondents at College 1 indicated that science student teachers are very much aware of the challenges associated with use of internet. Student teachers were asked to indicate their agreement or otherwise of certain challenges common with use of internet. Data obtained indicated that science student teachers knew of the challenges and actually agreed to the hindrance to the use of internet. From Table 6a, 60% of the respondents strongly agreed that slow internet connectivity and lack of support from the IT department were major challenges confronting internet users. For student teachers inability to use computers, 50% and

25% of the respondents strongly disagreed and disagreed respectively. This indicates that inability to use computer is not a challenge at all to the students. On lack of information about how to use internet resources, 35% strongly agreed and 35% also agreed to it, showing that there is some high level of positive response to that. Equally, the respondents agreed generally that health constraints to the use of internet is a challenge to them. 40% and 30% strongly agreed and agreed respectively to that. The results obtain is not far from Makinde et. al, (2018) that the cost, infrastructure inadequacies, lack of skills, lack of relevant software and limited access to internet are some notable challenges against the use of internet.

Challenges science student teachers face in using internet resources

On the challenges science student teachers faced in using the internet, a number challenges were identified. The challenges were; lack of computer facilities in the Colleges, power failure, slow internet connectivity, non- connectivity, inability to use computer, inability to find relevant information, lack of information about how to use internet resources, lack of time acquire the skill to use internet resources, lack of support from the IT department, less resources available to your subject area and health constraints. The science student teachers were to show their agreement or otherwise. The options were; strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. Table 6b presents results for College 2

Table 6b: Challenges to the use of internet by Science Student Teachers College 2

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Lack of computer facilities in the COE	11 (55%)	3 (15%)	5 (25%)	0 (0%)	1 (5%)
Power failure	5 (25%)	7 (35%)	6 (30%)	1 (5%)	1 (5%)
Slow internet connectivity	12 (60%)	4 (20%)	3 (15%)	0 (0%)	1 (5%)
Non- connectivity	9 (45%)	2 (10%)	6 (30%)	2 (10%)	1 (5%)
Inability to use computer	3 (15%)	9 (45%)	1 (5%)	5 (25%)	2 (10%)
Inability to find relevant information	6 (30%)	2 (10%)	4 (20%)	5 (25%)	2 (10%)
Lack of information about how to use internet resources	4 (20%)	6 (30%)	3 (15%)	4 (20%)	3 (15%)
Lack of time to acquire skills to use internet resources	4 (20%)	7 (35%)	5 (25%)	2 (10%)	2 (10%)
Lack of support from the IT department	5 (25%)	4 (20%)	4 (20%)	6 (30%)	1 (5%)
Less resources available to your subject area	6 (30%)	9 (45%)	3 (15%)	1 (5%)	1 (5%)
Health constraints	8 (40%)	1 (5%)	2 (10%)	6 (30%)	3 (15%)

Source: Field Data, January and February 2021

In Table 6b, respondents generally agreed to all the indicators either strongly agreeing or agreeing with a few of them also strongly disagreeing or disagreeing to some of the indicators. Slow internet connectivity dominated in terms of respondents' strong agreement. 60% of them strongly agreed that slow internet connectivity is a challenge with 20% also agreeing. Other indicators that received general acclamation were lack of computer facilities, non- connectivity and health constraints. However, a good number of them were also undecided in one way or another in all the categories. With the issue of power failure and non- connectivity, 60% of the respondents neither

agreed nor disagreed. Again, on lack of computer facilities in the College and lack of time to acquire skills to use internet resources, 25% of the respondents neither agreed nor disagreed to them. The data agrees with, Nafrees, Roshan, Baanu, Nihma, and Shibly (2020) who found that Students have problems using the internet because of slow internet, power failure and high cost involved in getting the internet connectivity.

Challenges science student teachers face in using internet resources

On the challenges science student teachers faced in using the internet, a number challenges were identified. The challenges were; lack of computer facilities in the Colleges, power failure, slow internet connectivity, non- connectivity, inability to use computer, inability to find relevant information, lack of information about how to use internet resources, lack of time acquire the skill to use internet resources, lack of support from the IT department, less resources available to your subject area and health constraints. The science student teachers were to show their agreement or otherwise. The options were; strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. Table 6c presents results for College 3

Table 6c: Challenges to the use of internet by Science Student Teachers College 3

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Lack of computer facilities in the COE	12 (60%)	0 (0%)	1 (5%)	0 (0%)	7 (35%)
Power failure	10 (50%)	4 (20%)	3 (15%)	2 (10%)	2 (10%)
Slow internet connectivity	13 (65%)	3 (15%)	2 (10%)	1 (5%)	1 (5%)
Non-connectivity	4 (20%)	2 (10%)	4 (20%)	1 (5%)	9 (45%)
Inability to use computer	2 (10%)	3 (15%)	2 (10%)	6 (30%)	7 (35%)
Inability to find relevant information	1 (5%)	3 (15%)	4 (20%)	6 (30%)	6 (30%)
Lack of information about how to use internet resources	3 (15%)	4 (20%)	4 (20%)	3 (15%)	6 (30%)
Lack of time to acquire skills to use internet resources	7 (35%)	7 (35%)	3 (15%)	2 (10%)	1 (5%)
Lack of support from the IT department	5 (25%)	5 (25%)	2 (10%)	1 (5%)	7 (35%)
Less resources available to your subject area	5 (25%)	4 (20%)	2 (10%)	1 (5%)	8 (40%)
Health constraints	10 (50%)	3 (15%)	3 (15%)	2 (10%)	2 (10%)

Source: Field Data, January and February 2021

The responses are even much more interesting as 60% of the respondents strongly agreed that lack of computer facilities in the College is a challenge with 35% of them also disagreeing strongly. However, 5% neither agreed nor disagreed as shown in Table 6c. For slow internet connectivity, 65% of the respondents strongly agreed, 15% agreed, 5% either strongly disagreed or disagreed with 10% neither agreeing nor disagreeing. Health constraints also gave interesting responses. 50% 0f the respondents strongly agreed, 15% agreed, 10% disagreed, 10% strongly disagreed and 15% of the respondents neither agreed nor disagreed to health constraints as a challenge to the use of internet. On lack of time to acquire skills to use internet resources, 35% strongly agreed, 35% agreed, 5 strongly disagreed, 10% disagreed and 15% neither agreed nor disagreed to that.

The challenges the science student teachers from all the tree Colleges of Education are similar. For instance, from the results obtained indicates that student teachers agreed strongly that slow internet connectivity a challenge to them. It can be seen that 60% agreed strongly to this from both College 1 and College 2 and 65% agreeing strongly at College 3. This is a strong indication that the results are similar.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.0 Overview

This chapter looks at the summary of the research. The results as presented in chapter indicates that internet is very important to student teachers in their quest for academic excellence. The main findings are therefore summarized in this chapter. The chapter further looks at the conclusions that can be drawn from the findings and the results. The results from the data collected indicates that internet is useful to student teacher, it also shows that student teachers see as an important source of information. It further shows that even though internet provides a good platform for learning, there are challenges student teacher face in using it which must be overcome to yield full benefits. Finally, this chapter will make recommendations to the stake holders to act on. The recommendations are done to improve practice, guide practice and inform policy formulation. Suggestions for further studies were also made in this chapter so as to give a cave yard for prospective researches to do their research.

5.1 Summary of the Findings

The purpose of this work was to investigate science student teachers use of internet and how it impacts on their learning of science. This study sought to look at the internet as tool for accessing information by student teachers, types of internet resources and services available to science student teachers, effective use of internet by science student teachers, effects of internet on student teachers performance in science and finally, the challenges face by science student teachers in the quest to use internet by educational purposes. 60 Science Student Teachers across three Colleges

in the Northern Region, namely, College 1, College 2 and College 3 were used to collect data for study. A quantitative survey was used for this study. The key findings based on the analyses of the questionnaire in line with the research questions are presented below.

5.1.1Types of internet resources Science Student Teachers use

On the issue of internet resources availability and accessibility, the data revealed that majority of the science student teachers were aware of the availability. The student teachers main mode of accessing the internet resources; Journals, online library catalogues, electronic books, workshops, reports, social network sites, research repository, magazines, and mailing groups were mainly accessed through institutional subscriptions. The data in table1 shows that majority of the participants indicated that they mainly access the internet resources through institutional subscriptions. However, social media platforms did not follow the same trend. It can be seen that all the science student teachers indicated that they access social media platforms from their personal subscriptions. It can therefore be concluded that science student teachers would not mind buying data to access social media platforms but would only wait to connect to the internet through institutional subscriptions.

5.1.2 Importance of internet resources to science student teachers

The science student teachers were to indicate whether the internet resources presented to them were important. There was a strong agreement by the participants that the internet resources were important to them. Except a few of them who were not very familiar with internet resources and so indicated they did not know, majority thought it was very important to them. Journals, online library catalogues, electronic books, workshops/ seminars, reports, social network sites, magazines and mailing

groups equally were generally acclaimed to be important to Science Student Teachers. Science Student Teachers therefore saw those internet resources as important and would hence use them to search information for their academic work.

5.1.3 Advantages of internet use on Science Student Teachers performance in science

Science Student Teachers performance in science is influence directly by their use of internet. Analysing the means of the examinations results of students' first and second semester, it is revealed that students' performance increased significantly after they consciously became aware of internet resources. The means of the Colleges in the first semester is smaller than the means of the Colleges in the second semester. This shows that the science student teachers performance went up indicating the impact the internet has had on the performance of the students. The findings agrees with Jibrin, Musa and Shittu (2017) who found the effects of internet on the academic performance on tertiary institutions students to be beneficial tools in the era of information and communication technology used in academic exercise.

The study also found that the student teachers were using the internet for the first time whiles others had used it above nine months. Those who were using it above nine months used it productively than those who using it the first time. As such the first time users did not benefit from internet as those using above nine months.

Furthermore, the study found that the science student teachers found internet exciting during their first time of usage. A few of them found it not exciting. Those who found it exciting used it more productively than those who found it no exciting.

On science student teachers reason for using internet, majority of them used it for social media whiles the rest used it for academic purposes. Those who used it for social media also claimed they benefit academically from the use of internet.

The data also revealed that the science student teachers found the internet useful. The data indicates that science student teachers know of the usefulness of internet services as such rely on it to source information for their academic work as well as their social interaction.

Science student teachers in all the Colleges under consideration access internet services mainly from the college campus. The study found that all the participants were of the view that they can get access to internet when they are on the colleges' campuses. A few others also believed they access the internet in the dormitory with the rest holding the view that they can access internet in the library. The research found that the internet is strong especially around the classes' areas, library and weak at the dormitories.

The science student teachers indicated strong agreement to the multiple choice formats, fast access, multiple user access, easy accessibility, wide range of information availability, quick retrieve ability, updated resources, free access, full text search, links to other sources, multimodality and readable on portable devices as the advantages that go with the use of internet. To these, science student eithers either agreed or strongly agreed to the advantages the internet present.

5.1.4 Challenges science student teachers face in using internet resources

The study identified three key challenges science student teachers face in using internet resources. The main challenges were lack of computer facilities in the

college, slow internet connectivity and lack of support from the IT department. Power failure was also identified as a challenges but not very strong.

5.2 Key findings

The following are the key findings:

- Science student teachers in the three selected Colleges of Education were aware that you can only get access to the internet information through, personal subscription, institutional subscription or free access
- Science student teachers in the three selected Colleges of Education internet access mode for academic purposes was mainly the institutional subscription.
- Science student teachers in the three selected Colleges of Education accessed social media through person subscription.
- Science student teachers in the three selected Colleges of Education were aware of internet resources available to them
- The science student teachers in the three selected Colleges of Education were very much aware of the importance of the internet resources to them.
- Science student teachers in the three selected Colleges of Education effectively used internet resources for academic purposes.
- The effective use of internet resources by science student teachers in the three selected Colleges of Education had a direct effect on their academic performance in science
- More science student teachers in the three selected Colleges of Education were using the internet above nine months as against first time users
- Science student teachers in the three selected Colleges of Education who were using the internet for the first time found it exciting

- Many science student teachers in the three selected Colleges of Education used the internet for social media than for academic purposes
- Science Student Teachers in the three selected Colleges of Education found the use of internet in the College useful to their academic work.
- Science Student Teachers in the three selected Colleges of Education mainly accessed the internet when on campus.
- Science student teachers in the three selected Colleges of Education found internet advantageous.
- Science student teachers in the three selected Colleges of Education found that lack of computers, slow internet connectivity and lack of support from the IT department as some challenges the face in using internet.

5.3 Conclusions

Internet is an interconnection of computers through which users search, receive and transmit information to others through suitable media. This present study has shown that science student teachers in the Colleges of Education use internet for their academic needs. Colleges of Education have come to know the importance of internet to student teachers learning. As such efforts are being made to provide internet resources and services to student teachers. IT departments in the Colleges being major stakeholders in the provision of internet resources and services are at the forefront in ensuring that student teachers benefit from these services. Tutors at the Colleges of Education are the main agents in implementing the decision to make internet accessibility a reality. Despite the benefits and the efforts by the major stakeholders, access to internet at the Colleges is still limited. Student teachers who make frantic efforts to access and use internet perform better in science than those who don't use it. Science student teachers put the internet to different uses. Those

who use it for academic purposes see the influence it has on the academic performance in science than those who using for social media. How familiar to the internet also has direct effect on the performance of science student teachers in science. Student teachers that are familiar to the internet use productively than the first time users and as such perform better in science than the first time users. More so, science student teachers who find the internet exciting during the first time usage see it as a useful site and benefit from its usage.

It can therefore be concluded that internet play a key role in influencing the academic performance in science at the Colleges of Education. However, there still certain challenges that face the use of internet at the Colleges of Education. Internet connectivity should be made a priority in the Colleges of Education so as ensure a significant improvement in student teachers performance in science. Student teachers need to be properly engaged on the use of internet as a significant determinant of academic performance in science.

5.4 Recommendations

Internet is seen as a very important resource that has the potential of influencing the academic performance of science teachers in the Colleges of Education. For the full benefits of the internet to be received, the following recommendations must be observed.

- The government should help the three selected Colleges of Education to get ultramodern ICT centers which are well connected with reliable and time tested internet services for the Colleges of Education. This is important because the provision of reliable internet services can significantly increase the academic performance of student teachers in the Colleges. This must be

followed by the provision of reliable power supply to the colleges to ensure efficient use of internet services.

- The governing councils of the three colleges should work at getting computers and smart phones for student teachers at the Colleges at a subsidised prices. Since many of the colleges are under resourced with computers, its impact id great on the student teachers. As such, government's intervention in proving computers to resource the computer laboratories in the colleges could help a lot.
- The three Colleges of Education must prioritise provision of internet in the Colleges. The management of the various Colleges of Education make it a prioty to provide internet services to the students to use or strengthen the existing internet facilities in those Colleges since the trend of learning globally has changed from library to internet. This will ensure that there is full access to internet services in the Colleges.
- The three Colleges of Education should strengthen the information communication technology (ICT) centers to ensure that they are well equipped to take care of the information and communication technology needs of student teachers. This should include acquiring high speed internet connection with maximum bandwidth to address the problem of slow internet connectivity
- The three Colleges of Education should equip the IT departments with both human resource and equipment so as to be well resourced to give advisory and support services to tutors and student teachers. This will go a long way to ensure a complete utilisation of the internet services at the Colleges of Education in Ghana.

- The IT officers in the three Colleges of Education in Ghana should liaise with the management of the Colleges to make their department standard with state of the art equipment to be able to help tutors and student teachers in their quest to use internet. In this regard, they will be better placed to organise regular in-service training for tutors and orientation courses for student teachers on the effective use of internet at the Colleges.
- Tutor from the three Colleges of Education should regularly engage student teachers to know the importance of internet to their academic performance. Tutors should give clear guidance to student teachers so as to effectively use internet for academic purposes. They should therefore make frantic efforts to give exercises and assignments that will require the student teachers use of internet.
- Student teachers of the three Colleges of Education should devote much of their time to use internet for academic purposes instead of social media. When they turn the social media to platforms that can enhance their learning by constantly sharing information related to their studies on those platforms it will significantly increase their academic performance.

These suggestions are not exhaustive. I believe that if the suggestions are taken into consideration and implemented, science student teachers academic performance is going to increase further. It is therefore hoped that the suggestions that have been made will be implemented.

5.5 Suggestions for Further Research

Issues related to internet are too broad and cannot be done in a single study. There are a lot of things that the research could have cover but for the limitations and delimitations of this study. I am therefore suggesting the following areas that can be conducted in subsequent studies.

- Internet as a factor affecting the social life of science student teachers in the Colleges of Education in Ghana. Some work should be done to get to know if internet affects the social life of the student teachers. This will also help reveal the internet affect the social lives of the science student teacher in the College.
- The type of support services needed by science student teachers to effectively use internet at the Colleges of Education in Ghana. Science student teachers needs may be diverse. It is therefore important a research is done to find out what the different support services needs the student teachers have.
- The science tutors internet knowledge base and its influence in helping science student teachers effectively use internet at the Colleges of Education in Ghana. This can be done in order to be clear if science tutors themselves have some knowledge on the use of internet and as to whether they can be of help to the student teachers.
- The different approaches adopted by science student teachers in using internet to enhance their academic performance in science. Since there are different ways in which the internet can be used for information purposes, it will prudent an extensive work is done to ascertain the approaches student teacher employ in using the internet.

- The internet usage of Science tutor and their delivery of lessons at the College of Education in Ghana. This research is important as it will reveal quite a lot about the ability of the tutors to use internet for information purposes. It will further reveal how they deliver their lessons if they use the internet judiciously.

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APPENDIX

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF SCIENCE EDUCATION

EFFECTS OF INTERNET USE ON SCIENCE STUDENT TEACHERS' PERFORMANCE IN SCIENCE AT SOME SELECTED COLLEGES OF EDUCATION IN THE NORTERN REGION

QUESTIONNAIRE FOR STUDENTS

The purpose of this research to find out science student teachers use of internet and how impacts their performance in science in the College of Education in Northern Region of Ghana. The information being requested is for research purposes only. The identity of the participants as well as information relating to them will be kept completely confidential. You are therefore requested to be as sincere and candid as possible in your responses to this questionnaire. This will help the researcher to get a very accurate, credible and reliable information for the research. Thank you in advance for you cooperation and time.

Please, tick (√) the right response

A. Access mode of internet resources

A. Which types of internet resources are available to you?

Type of Internet resources	**Personal Subscription**	**Institutional Subscription**	**Free Access**	**Not Available**
Journals				
Online Library catalogues				
Electronic Books				
Workshops/Seminars				
Reports				
Social network sites, i.e.; blogs, wikis etc. b				
Research repository				
Magazines				
Mailing groups				
Social media platforms, i.e.; Facebook, WhatsApp etc.				

B. Types of internet resources

B1. Which types of internet resources do Science Student Teachers Consider important and use for your academic work?

Internet resources	Very important	Important	Some Important	Not important	Don't Know
Journals					
Online Library catalogues					
Electronic Books					
Workshops/Seminars					
Reports					
Social network sites, i.e.; blogs, wikis etc. b					
Research repository					
Magazines					
Mailing groups					
Social media platforms, i.e.; Facebook, WhatsApp etc.					

C. Accessibility of internet resources

C1. How long have you been using internet resources?

1 – 4 months ( ) 5 – 8 months ( ) 9 and above

How was your first experience like?

Exciting ( ) not so exciting ( ) Boring

What did you use internet resources for in your first usage?

Academic work ( ) social media ( ) others ( ) specify ……...

How do you find internet resources now as compared to your first time?

Useful ( ) the same ( ) not useful ( )

C2. Where do you have access to internet resources?

i. At the dormitory ( )

ii. At school ( )

iii. At library ( )

iv. Others (specify)……

C3. Which search engines do you use in searching for information for your academic work?

i. Through online library websites ( )

ii. Through web portal ( )

iii. Through web search engines ( )

iv. Through sharing information via social media ( )

D. Use of internet resources

D1. For what purpose do you use internet resources?

Purpose	Always	Often	Sometimes	Rarely	Never
General Study					
Class presentation/ Assignments					
Course Work					
Research					
Any other (specify):					

D2. What are your reasons for using internet resources?

Reason	Always	Often	Sometimes	Rarely	Never
Searching for new information					
Browsing specific information					
Accessing full text of articles whose details were known to you					
Reading widely for general knowledge					
Any other (specify):					

D3. How frequently do you use internet resources?

Internet resources	Daily	Weekly	Monthly	Occasionally	Rarely
Journals					
Online Library catalogues					
Electronic Books					
Workshops/Seminars					
Reports					
Social network sites, i.e.; blogs, wikis etc. b					
Research repository					
Magazines					
Mailing groups					
Social media platforms, i.e.; Facebook, WhatsApp etc.					

D4. What are the advantages of using internet resources?

Advantage	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
Multiple choice formats					
Fast access					
Multi user access					
Easily accessible at any place					
Access to wide range of information					
Quick retrieve ability					
Updated resources					
Mostly resources are freely accessible					
Full text searching					
Links to other resources					
Multimodality (text, audio, visual etc.)					
Readable on Mobil/portable devices					
Any other (specify)					

E. Challenges to the use of internet resources

E1. What are the challenges that hinder the use of internet resources for information?

Challenges	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Lack of computer facilities in the COE					
Power failure					
Slow internet connectivity					
Non- connectivity					
Inability to use computer					
Inability to find relevant information					
Lack of information about how to use internet resources					
Lack of time to acquire skills to use internet resources					
Lack of support from the IT department					
Less resources available to your subject area					
Health constraints					
Any other (specify)					

(Adapted from Tariq, 2016)

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