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# Internet access and information retrieval competencies of high school students in Ghana

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### **Abstract**

*The Internet has provided many opportunities for students to access online information to expand their knowledge at a fast pace. In most Sub-Saharan African countries, access to Internet services by high school students are most often limited. Moreover, accessing online information requires skills for effective search and retrieval. The study therefore investigated high school students in Ghana's Internet access and retrieval competencies. SHS 3 students from three high schools in Ghana participated in the survey. The study revealed that students had limited access to the Internet at school and also lacked the needed skills to efficiently and effectively access online information. The study recommends the need to improve Internet infrastructure and also train learners on skills needed for effective online search and retrieval.*

**Keywords:** Access, Internet, Competence, Online information, High schools, Infrastructure

### **Introduction**

The Internet is a major technological tool that provides important opportunities for its adoption and use in educational institutions. The development, acceptability and adoption of the Internet and other ICTs by countries all over the world provide clear and great opportunities for enhancing quality teaching and learning (Van Reijswoud, 2009). These advancements towards the use of the Internet have changed the methodology of education and this has therefore made the Internet a very powerful tool within the educational sector (Jain, 2016:769). Technological development and increasing growth of the Internet connectivity have also helped in the building of inclusive and participatory knowledge societies as well as access to quality education. Similarly, it has also been found that, successful employment of ICT in education has helped in the promotion of effective teaching and learning (Gholami et al., 2010).

The Internet and other ICTs play an important role in development and maintenance of a country's economic growth and Ghana is currently changing the old system of classroom teaching and learning through the development and integration of ICT in its educational system

thereby making learners in Ghana become more technology oriented (Appiahene, Kesse and Ninfaakang, 2016:23). The integration of ICT into teaching and learning is seen as a priority by many governments and educational institutions in Ghana (Buabeng-Andoh and Yidana, 2015:105).

Information seeking is a complex communication process that involves the interaction between the information seeker, the information, as well as the information provider (Khosrowjerdi and Iranshahi, 2011). It is the process where an individual goes about searching for information, and this process requires the information seeker to apply personal knowledge, skill or personal information for the purpose of solving a problem (Olorunfemi and Mostert, 2012). Nkomo (2009:19) maintained that information-seeking has a long history; however, Internet-based information seeking is a “relatively new phenomenon”. This study therefore looks into the Internet-based information seeking and retrieval competencies of high school students in Ghana.

### **Methodology**

The study employed a quantitative approach through the use of the survey design. SHS 3 students from three high schools in Ghana, namely: St. Louis Senior High School (SHS), Effiduasi SHS and Simms SHS participated in the study. The SHS 3 students were selected because the ICT curriculum for high schools in Ghana prescribes the teaching of the Internet as a topic in SHS 2. This attests to the fact that among the students, the SHS 3s may have had more experience on the use of the technology. A total of 322 students were randomly sampled from a population of 2575 through the use of Saunders, Lewis and Thornhill’s (2012) sampling model Table at a 5% margin of error for the study. The table maintained that researchers can select 322 samples for a study when the study population is between 2000 and 5000. Hence the formula for selecting the samples for each school as presented on Table 1 was:

$$\text{Sample size} = \frac{\text{No. of SHS 3 students}}{\text{Total SHS 3 population}} \times 322$$

*Table 1: Population and sample of students*

<b>High School</b>	<b>Total number of SHS 3 students</b>	<b>Sampled students</b>
St. Louis SHS	748	94
Effiduasi SHS	920	115
Simms SHS	907	113
<b>Total</b>	<b>2575</b>	<b>322</b>

The simple random sampling technique used for the study is noted to be unbiased, while also requiring “some kind of sampling frame from which people can be chosen which lists everyone in the population of interest” (Gomm, 2008:135). A survey questionnaire was used for the data collection from the students. Content validation as well as cross-tabulation of data increased the credibility and reliability of the study (Mertens,2012).

### **Theoretical framework**

The study employed Wilson’s (1999) model of information behaviour as the theoretical framework. An attribute of the model refers to ‘demands on information system’ by the information user. In this case, learners are the information users and information system is the Internet. Wilson’s (1999) model’s ‘information seeking behaviour’ attribute guided the study on high school students’ online information seeking and retrieval competencies since this attribute looks into ways that information users are able to seek and access information.

Wilson (1999:263) asserted that information-seeking behaviour is “particularly concerned with the variety of methods people employ to discover, and gain access to information resources” such as the Internet to access information. An important requirement for accessing online information is the information users’ ability to access the Internet or using an intermediary to access the Internet on his or her behalf for the online information he or she desires

## **Literature review**

### **Internet and education**

All over the world, as opined by UNESCO (2014:59):

There is a growing body of research, government initiatives, and promising practices which support the view that, when technology is properly implemented in a systemic and coherent way with teachers' commitment and support, then students can develop meaningful knowledge, skills, values and attitudes which can empower them for lifelong learning and gainful employment.

The Internet has within a very short time become one of the effective tools in educational delivery with many countries regarding the understanding and mastering of its basic skills and concepts as essential element of education (Meenakshi, 2013:4). The development and use of Internet and other ICTs in education are providing solutions to enhance traditional delivery modes and pedagogies in the educational sector. Governments all over the world are therefore integrating ICTs in their educational sectors in order to improve teaching and learning by empowering teachers and learners with technology. For example, the Broadband for All Initiative in South Africa is designed to help address technological inclusion by minimising the divide between the connected and unconnected.

The Internet again provides a vast amount of information for learners and this has also made it the modern engine of progress by having a far more invasive effect on education (Jain, 2016:769). According to Denvir (2016:204), the Internet is offering a platform for information exchange, much of which is freely provided by a number of stakeholders for educational purposes. The development of digital technologies and increasing advancement of the Internet is so vivid that countries all over the world cannot afford to overlook the positive role of the Internet and other ICTs for improved access to education as well as enhancement of educational equity, quality, and relevance (UNESCO, 2014:56). Educators as well as learners are particularly applying an increasing number of learning tools via the Internet for teaching and learning.

During the World Education Forum in Dakar in the year 2000, 164 countries adopted a strategy termed "harness new ICTs to help achieve Education for All (EFA) goals" This strategy stresses

the link between education and the Internet and other ICTs as key enablers for sustainable development in the area of education. The strategy also advocates for the affordable use of the Internet and other ICTs towards the bridging of the 'digital divide' (UNESCO, 2014:56) by providing improved ways towards quality teaching and learning. This is in support of Kumar's (2016:138) study that found that, the Internet and other ICTs over the years were providing new and improved ways of working in education with ICT becoming both a field of study as well as an important dimension in education.

The Internet can therefore be said to offer “previously unavailable options for interaction with information for informal-to-formal learning” (Mills and Angnakoon, 2015:134). Current systems of education that are empowered by ICT driven infrastructure have a great opportunity of bringing up to the centre stage an ensured academic excellence, quality delivery and management in a knowledge-based society (Jain, 2016:769). This stems from the fact that, the Internet is becoming the integral part of education that enlarges society. It could therefore be said that the growing trend of education currently is based on the availability of the Internet and other ICTs in educational institutions. The Internet is therefore serving as an important resource towards development of many areas of knowledge society.

Mills and Angnakoon (2015:134) opined that the Internet and other “ICT tools provide a choice in options for learning”. The Internet has therefore made it easy for learners to acquire the skills they need to progress in their educational career since it motivates the learners to get good thinking skills and remain well informed (Jain, 2016:769). The application of the Internet and other ICTs for teaching and learning promotes educational delivery since it helps in accessing unlimited relevant information through the provision of efficient and effective services to take care of the informational needs of students (Bede, Termit and Fong, 2015).

UNESCO (2014:59) has outlined six strategies that provide enabling conditions for effective implementation of ICTs to contribute to educational development:

- The creation of holistic learning environments;
- Capacity-building and empowerment of students and teachers to use technology in meaningful ways;

- Content and curriculum development to facilitate the integration of ICTs;
- Assessment of authentic learning;
- Addressing the gender gap; and
- Exploiting emerging opportunities such as mobile learning.

### **Internet and Education in Ghana**

Countries all over the world are adopting and implementing strategies that will help make their educational systems very effective and efficient for a desired outcome due to the role education plays in socio-economic development (Victor, 2013). In this technological age, the role of an effective integration of the Internet and other ICTs in education cannot be overlooked by countries both developed and developing since the rapid growth in and constant evolution of the Internet and other technologies have made the world knowledge-driven (Buabeng-Andoh and Yidana, 2015:104). Countries are therefore putting measures in place for the adoption, implementation, and integration of ICT in their educational sector (Prasad, Lalitha and Srikar, 2015). The development and integration of ICT in Ghana's education is offering teachers and learners the essential tools to help them succeed in teaching and learning (Appiahene, Kesse and Ninfaakang, 2016:22).

Ghana was the first country in sub-sahara Africa to open-up its telecommunication sector resulting in increased growth of ICT infrastructure; and Ghana has over the years made much progress in putting in place measures to accommodate the usage of Internet and other ICTs in the education sector (Opoku, Badu and Alupo, 2016:185). There have been a number of policies and programmes formulations in Ghana towards the making of ICT education accessible to all students because of successive government's recognition of the important role ICT plays in education (Sekyi, 2012). The current policies of ICT usage in education put in place by the government of Ghana aim at employing the Internet and other ICTs towards socio-economic development (Tamakloe, 2014). The ICT competence development in Ghana was therefore planned both as an ICT subject, and as an integral component taught in all subject disciplines (Quaicoe, Pata, and Jeladze, 2016:4889).

The government of Ghana has over the years championed the use of the Internet and other ICTs in education for improved educational outcomes. They have outlined for example “The Education Strategic Plan (2003-2015) and (2010-2020) of the Ghana Education Service” which are geared toward identifying the role and need for ICT in the educational sector to help achieve the aims of the “Education Strategic Plan, which are carved into Access, Quality, Gender and Inclusiveness, and Education Management” (Natia and Al-hassan, 2015:114).

According to the Ministry of Education report (2003), a committee for National ICT Policy and Plan Development was set up in the year 2002 by the government of Ghana for the formulation of ICT policy. This committee consequently developed the Information and Communication Technology for Accelerated Development (ICT4AD) Policy which was adopted and implemented by the government of Ghana. The policy outlined the plans and strategies in a framework of how ICTs can be used to facilitate the national goal of “transforming Ghana into an information and knowledge-driven ICT literate nation” (ICT4AD, 2003). This policy provided the basis for Ghana’s vision for the information age and was part of the “Government of Ghana’s commitment for a comprehensive programme of rapid deployment, utilisation, and exploitation of ICTs within educational sector and other sectors in the country” (Buabeng-Andoh and Yidana, 2015:105).

The objective of the policy was to improve human technical expertise and the training of instructors and experts in the use of the Internet and other ICTs in education. The policy takes into consideration the provision of key socio-economic development frameworks which are contained in Ghana's Vision 2020. The ICT4AD policy also outlined 14 cardinal pillars and the promotion of ICT in education was the second pillar, which projected “the deployment and exploitation of ICTs in education” as a priority and the focus was on prioritising training, research and generation of resources for expansion of ICTs (Natia and Al-hassan, 2015:114). The Government of Ghana through the Ministry of Education in furtherance to the ICT4AD policy, on the basis of promoting ICT in education, set up a committee for the review of the whole educational system to recommend ways for the integration of ICTs in Ghanaian education.

The committee worked under the theme “Meeting the challenges of education in the twenty-first century” and made recommendations on educational reforms that were technology driven. The recommendations of the committee propelled the Ministry of Education to formulate a draft policy called “ICT in Education Policy” in the year 2008. The framework of the policy prescribed how the Internet and other ICTs should be introduced and implemented in senior high schools in Ghana in order to meet the challenges of education in the global information age (MoE, 2008).

The objective of the policy was

To enable all Ghanaians including teachers and students in either the formal, informal and non-formal systems to use ICT tools and resources to develop requisite skills and knowledge needed to be active participants in the global knowledge economy at all times (MoE, 2008:28).

The policy proposed the introduction of ICT as both a core subject and elective subject in schools. In addition, the policy proposed the integration of the Internet and other ICTs to support educational management as teaching tools for all subject areas as well as administrative functions (Buabeng-Andoh and Yidana, 2015:105).

The integration of the Internet and other ICTs in Ghana's educational system is not without issues since lack of access to appropriate technologies exists in most places and in most schools, thereby hampering the effective use of the Internet and other technologies by teachers and students for teaching and learning (Appiahene, Kesse and Ninfaakang, 2016:23). Schools in Ghana are provided with digital service opportunities, such as electricity, free ICT skills training for teachers and free ICT tools and infrastructure for schools, but in reality, not all of these services are available in all the schools in the country. For example, some schools are yet to have Internet access and some teachers are not yet trained for ICT skills (Quaicoe, Pata, and Jeladze, 2016:4889).

The Government of Ghana recognises the need for ICT in education; however, the state of ICT infrastructure and tools in the educational sector of Ghana are not encouraging as access to Internet and other ICTs are below standard making it difficult for the effective use of the Internet

for teaching and learning; This is because “many of the schools especially do not have ICT tools and equipment and the few schools with ICT tools and equipment complained of inadequacy” (Natia and Al-hassan, 2015:122).

In Ghana, studies have shown that, teachers’ access to ICT tools is better as compared to students (Quaicoo, Pata, and Jeladze, 2016; Natia and Al-hassan, 2015). This could probably be due to computers made available to teachers who are pursuing distance education and the distribution of laptops to teachers by the Ministry of Education through the “teacher laptop and ICT Project”. Although, teachers’ access to ICT tools such as computers are encouraging, it has been revealed that, their ability to use them for teaching is weak; thus, the ability and capacity of teachers to effectively perform through the use of the Internet and other ICTs is low due to lack of regular training and poor Internet access (Natia and Al-hassan, 2015:123).

### **School library and Internet Acceptable Use Policies**

The school library in many institutions serve as a technology hub that “meets many different learning needs and preferences, such as working alone, working with others, relaxing, and positive socialising with the school librarian, teachers and other students” (Harper, 2017:51). The growth in Internet usage in libraries and schools are compelling school administrations to struggle with appropriate policies to regulate its acceptable use and future developments (Sun and McLean, 1999:1). However, policy limitations “ought to be addressed and accommodated in such a way that the policy will make allowances for new developments and anticipated change” (Du Toit and Stilwell, 2012:128).

Bosco (2011:2) argued that, ICT policies in schools have two dimensions: ensuring that “students are protected from pernicious materials on the Internet” and enabling “student access to the extensive resources on the Internet for learning and teaching”. An Internet Acceptable Use Policy (AUP) stipulates these two dimensions and it provides, in some cases, legal rules that lessen the chance of conflicts. These policies are therefore to ensure guidelines, rules, reasonable procedures, non-discriminatory and neutral viewpoint restrictions on Internet access and computer use at school (Batch, 2015:63).

In 2006, the Global e-Schools and Communities Initiative (GESCI) commenced the Ghana e-Schools and Communities Initiative as the framework for all ICT in Education initiatives in the country. The GESCI through this initiative assisted Ghana Ministry of Education to create its first ever Curriculum Framework in 2009. Other beneficiaries of GESCI initiatives and interventions in Africa are Kenya, Namibia, and Rwanda.

Many countries in Africa are not having functional school libraries and a major contributing factor to this is lack of national school library policies in these countries. In Ghana, the situation with school libraries and their policy formulation is not much different from what prevails in other African countries (Omenyo, 2016:24). Studies have found that, many schools do not have well-resourced and functional libraries due to lack of a legislated policy to regulate the establishment of libraries in schools (Donkor, 1999; Amavi, 2008; Bentum, 2012). The GESCI and Nepad e-School initiatives assisted the Ghana Ministry of Education (MoE) with policy frameworks on ICT developments in schools but these policy frameworks are yet to be legislated. Lack of a legislated school library policy in Ghana has made it possible for some schools to operate without providing for functional school libraries (Alemna, 2000; Alemna, 2002; Banbil, 2011).

### **Internet access of high school students**

The Internet seems to be the most preferred source of information for high school learners worldwide and studies in the advanced countries have found that, most students started accessing the Internet at a very young age (Czerniewicz and Brown, 2010:367; Malliari, et al., 2014:272). Accessing the Internet for online information provides the advantage of a faster access as well as extensive information pools and these advantages compel many students in high schools to regularly search for information on the Internet (Sugihartati and Harisanty, 2014:25). It is evident that, the Internet could be accessed everywhere including homes, shops, schools, and in public places such as airports, hospitals and many other places.

Although the nature of high school students' access to the Internet has dramatically changed over time, it is estimated that over ninety percent of students in the USA are online and this percentage has been consistent since 2006 (Madden, et al. 2013:3). More than 85% of students in

the advanced countries are believed to access the Internet several times a day with over 80% of them having a personal computer (98.5%) and more than 70% accessing the Internet from their homes (Montagni et al., 2016:3). Shiweda (2013:23) had also asserted in her study that, many students in developed countries live in homes that are connected to the Internet thus are able to access the Internet from home. This wide availability of Internet has made it easy for high school students to reach the information they need easily and this ease of reach has to a large extent brought along changes in the information seeking and retrieving behaviour of students since information on the Internet is “almost free moneywise” (Özmen, 2015:779). Access to the Internet has therefore, undoubtedly, changed students’ information behaviour (Sharahi et al., 2014:615).

Shiweda (2013:22) in her study maintained that the

Internet has become an essential component of every library, allowing it to function as a gateway to vast reserves of dispersed information and thus transforming the way students, scholars and librarians think about collections and service.

She further opined that most students in Namibia access the Internet from their school libraries and this has changed how learners view the collections and where they can find information. Studies have established that, most high school students are able to access the Internet at their schools and the infrastructure for Internet access in these educational institutions is primarily located in the institutional libraries, computer laboratories and offices (Nkomo, 2009; Krige, 2009). It is also evident that, the use of personal computers for Internet access is also increasing among students (Malliari, et al., 2014).

### **Accessing the Internet via mobile phones**

Mobile phone abundance is changing Internet access dramatically for learners all over the world (Porter et al., 2016:23). Accessing the Internet through mobile phones has become part of peoples’ daily lives and it has been found that the use of mobile phone for Internet access “in a learning system is very effective especially in the secondary and higher secondary level students” (Hasan et al., 2016:52-53). Particularly, the use of mobile phones by young people for Internet access has increased significantly across Sub-Saharan Africa over the last decade (de

Bruijn, Nyamnjoh and Brinkman, 2009; Porter et al., 2012). Mossberger, Tolbert and Anderson (2017:1587-1588) maintained that “the Internet is increasingly mobile, as the surge in ownership of Internet-enabled smartphones indicates” and people who frequently access the Internet through mobile phones “tend to be young”.

Currently, users have adopted the use of mobile phones for Internet access at a faster rate than any technology device (Meeker and Wu, 2013, Farago, 2012). Clearly, most mobile phone users relish many forms of Internet access and accessing the Internet through cell phones provide them advantages of mobility and portability which in some ways afford “even greater convenience and more continuous use” (Mossberger, Tolbert and Anderson, 2017:1589).

Most students access Internet through mobile phones because they are less expensive than laptop and desktop computers (Mossberger, Tolbert and Anderson, 2017:1589). Nevertheless, mobile phones compare to laptop and desktop computers have small screen sizes and keyboards that make them difficult to use for many online activities (Goldman, 2012; Wortham, 2011). A study by Smith and Page (2015:15) found that almost half of users who accessed the Internet via mobile phones had difficulties in accessing online contents.

### **Studies related to Internet access of High School students**

According to Rice et al. (2015:756-748), more than ninety-five percent of high school students in the United States of America (USA) use the Internet, with more than half of them accessing the Internet several times within a day. Additionally, majority of these students have their own cell phones connected to the Internet and thus access the Internet exclusively from their phones and this allows them more private Internet use. Their study further revealed that homes of high school students were the highest-rated Internet access point since one-third of them accessed the Internet from their cell phones mostly at home.

In addition, it is reported that about one-third of high school students in the USA used the Internet for at least one hour in a given day, while less than 3% reported never using the Internet. A study by Rideout (2015:56) in the USA showed that, about ninety percent of high school students had either a laptop or computer at home and most of these gadgets were connected to

the Internet. However, majority of these students according to the study preferred using their smart phones as Internet access points. High school students in the USA who were using smartphones as their primary Internet access point were likely to spend more time online than learners using computers (Atwood, 2016:94).

The three studies conducted in the USA (Rideout, 2015; Rice et al., 2015; Atwood, 2016) depict that most high school students have regular access to the Internet both at home and school. This could be attributed to the technological advancement in the country. Although, students were found to spend more time accessing the Internet in a day (Rideout, 2015; Atwood, 2016), it was also evident from the study (Rideout, 2015) that students spend lesser time accessing the Internet. These contradictions could stem from the fact that both studies were state-based studies (Rice et al.'s study in Los Angeles and Atwood's study in Utah), while Rideout's study was countrywide. It is important to note that, these studies were conducted among students who live in a developed country with much improvement in their ICT infrastructure. The current study therefore brings different perspective into students' access to the Internet since it was conducted in an environment (Ghana) that has a technological advancement gap compared to the USA.

According to Herout (2016:1057), it is quite common that high school students are better equipped than their instructors in relation to Internet access and competencies since modern technology is mostly used by the youth on a daily basis. His study among students in Czech Republic revealed that, about 90 % of students owned a mobile phone and thus accessed the Internet via their phones. On average, most of the students accessed the Internet at early stages of their lives and about 75% of them were able to access the Internet on their devices freely as they wished (Herout, 2016:1062).

Borca et al.'s (2015:52) study in Italy among high school students found that, over 90% of students had personal computers at home with majority of them accessing the Internet every day. The study further indicated that, only 11% of students surfed the Internet for less than an hour each time, while 52% surf the Internet for 1 or two hours each time, and 30% of students surfing from 3 to 6 or more hours each time.

According to Malliari et al. (2015:273), majority of high school students in Greece were exposed to the use of the Internet at the Primary School level. Their study among high school students depicted that, almost all students in Greece had Internet access in their schools with more than 85% of them having access to the Internet in their homes. Regarding computer and Internet use, almost 50% of students spent between 1 and 3 hours per day using the Internet. The study further indicated that male students were heavier users of the Internet than female students.

The European countries, Italy, Greece, and Czech Republic have good ICT infrastructure compared to Ghana. It is therefore not surprising to find students been exposed to the Internet in these countries at early stages of their lives. However, the studies found that majority of students in Greece and Italy were exposed to the Internet at early stages of their lives (Malliari et al, 2015; Borca et al., 2015) as compared to students from Czech Republic (Herout, 2016). Although, all the three countries are located in Europe, the contradictions in students' Internet exposure age could be attributed to the fact that there exist technological gaps among countries in Europe.

A study in South Africa by Czerniewicz and Brown (2013:48) also showed that, most students from disadvantaged backgrounds and areas without infrastructure such as basic electricity were not able to afford devices such as personal computers due to financial constraints. They further stated that such 'poor' students in South Africa accessed the Internet at community centres, work places, schools, and libraries.

In Namibia, there exist an EduNet initiative which is a public/private partnership between the Xnet Development Alliance Trust (Xnet), Telecom Namibia and the Ministry of Education and the core function of this initiative is "to provide affordable, reliable and equitable connectivity and access to information for all educational institutions". Internet access for learners is therefore made possible through EduNet, ExNet, Telecom and the Ministry of Education. This initiative has connected more than 300 schools to the Internet making majority of learners in Namibia able to access the Internet from school. The government of Namibia also in 2012 announced "free Internet access provision to schools, other educational institutions, clinics, hospitals and free use of Internet access at libraries" which serves as key components for a pro-poor approach in

providing “learners and citizens with access to electronic information and e-governance service” (eLearning Africa, 2012).

Moreover, a study by Shiweda (2013:62) among high school students in Namibia also revealed that students’ access to the Internet via cell phones was on the increase, however, the use of the cell phones to access Internet mostly occur after school hours and during weekends.

A study by Tayo, Thompson and Thompson (2016:2-3) in Nigeria also showed a significant number of high school students having neither a personal computer nor laptop. The study further found that, majority of these students in Nigeria were accessing the Internet through Cybercafés or cell phones. Personal ownership of computers and personal Internet access were mostly therefore available to students in Nigeria via cell phones and Cybercafés.

The literature has made it clear that governments in Africa are making efforts in the development of ICT in education. For example, the Broadband for All Initiative in South Africa, the Edu Net, and ExNet in Namibia as well as the ICT4D in Ghana are all geared towards the development of ICT in education. It is however clear that the approaches differ from country to country.

### **Internet access of high school students in Ghana**

High school students in Ghana are now of a generation that can be described as Internet savvy since it is common to see most educational institutions connected to the Internet and providing Internet access to educators and learners (Frimpong and Vaccari, 2015:398). The interest of accessing the Internet among high school students in Ghana keeps increasing (Akom, Asante and Adjei-Frimpong, 2016:21).

Clearly, knowledge acquisition in ICT through the educational system of Ghana as well as Internet availability across the country are being capitalised upon by students who own smart phones or other mobile devices for accessing the Internet in their homes, schools and public places (Kwabia, 2015:4). The ownership of mobile devices among high school students in Ghana has reached a sufficient range for integration in educational activities since more than 80% of learners own either a mobile phone or tablet with Internet connection (Grimus and Ebner,

2016:9). Similarly, most high schools in Ghana have well equipped computer laboratories with some of them having Internet access for students coupled with about 40% of high school students in Ghana living in homes that have access to the Internet (Akom, Asante and Adjei-Frimpong, 2016:21).

Although, majority of high schools in Ghana have well equipped computer laboratories (Akom, Asante and Adjei-Frimpong, 2016:22), “low number of computers and poor maintenance resulting in uncountable virus attacks, insufficient connectivity, frequent power outages makes it nearly impossible” for most high school students to access the Internet via their schools’ computer laboratories and this compel students to use mobile devices to compensate for the limited access to computers and Internet (Grimus and Ebner, 2016:12).

Internet use among students in Ghana is officially limited to computer laboratories during school hours in high schools (Grimus and Ebner, 2016:14-15). However, limitation of computers with Internet access motivate students to access the Internet via their mobile devices when they get the opportunity.

### **Internet and Information seeking among students**

Information is now regarded as the central focus of life since it is treated by many people including students as a commodity, thus, traded for a price (Bhattacharjee and Sinha, 2016:266). The Internet is an important tool for accessing information. The number of people using the Internet grows very fast thereby increasing the impact of Internet usage in sectors such as education (Lo and Ahmadian, 2014:48). The Internet is noted to serve as a digital object tool and this tool has enriched the learning experience of students by giving them new forms of access to information (Anyaku, Nwafor-Orizu, and Oguaka, 2015:153). This has made it possible for high school students to access the Internet to benefit from the resource of information available on it (Liu et al., 2013:21).

An information need differs from one person to another and this means that the need for information among students will not be the same though it might be similar (Bhattacharjee and Sinha, 2016:266). People require information as their fundamental need in executing their tasks

and this need eventually turn to become a motive of information seeking activities (Sugihartati and Harisanty, 2014:21). Information-seeking activities help in solving daily problems thus the “mastery of life” (Savolainen, 1995:262). This implies that, information and information needs have use or purpose in human lives and both can be satisfied by seeking or browsing (Case and Given, 2016:5).

It is important to note that, seeking information on the Internet has become extremely popular with students and this has contributed to the Internet becoming part of students’ everyday lives (Gauducheau, 2016:44). A study by Owolabi (2007) revealed that, students used the Internet as their major source of information for their academic and personal development. This was confirmed by Soyemi and Mojisola’s study (2015:87) which showed that, students mostly rely on the use of the Internet information sources to complete their “class assignment, write project and research, and to update knowledge”.

Seeking information on the Internet is a goal-directed behaviour and this differs from undirected Internet surfing, in which “individuals are exposed to information with no specific informational need” (Liu et al., 2013:26). Information seeking could be defined as “a conscious effort to acquire information in response to a need or gap” in one’s knowledge (Case and Given, 2016:6). Information seeking has been established as the most commonly discussed concept in LIS.

The tasks, attempts and actions that are carried out by a person “to solve an information need or problem through his cognitive, emotional and physical actions done in any environment of his search” sums up the process of information retrieval (Ogba, 2015:3). On the other hand, Internet-based information retrieval requires the information seeker to search through the Internet in order to extract relevant information that satisfies his/her information needs (Soyemi and Mojisola, 2015:87). Internet-based information seeking is therefore seen as the process information users engage to change their state of knowledge by using information sought on the Internet (Nkomo, 2009:19).

Seeking information on the Internet “constitutes a strategy as an individual actively seeks information and is aware of what is needed” (Gauducheau, 2016:44). It is however clear that,

Internet-based information seeking has become “an important component of students’ daily Internet use” since they frequently seek information on the Internet to solve daily life problems (Liu et al., 2013:21). Students frequently access the Internet in search of relevant materials related to their academic works as well as acquiring relevant information for knowledge achievement (Lo and Ahmadian, 2014:48). The process of seeking information on the Internet has been noted to enhance students’ life satisfaction in information seeking (Anyaoku, Nwafor-Orizu and Oguaka, 2015:153; Liu et al., 2013:26).

Although, information needs of high school students seem quite different and complex compared to the information needs of tertiary students, their information needs and use of online sources is just like tertiary students’ online information needs (Chang and Gomes, 2017:349). Both tertiary students and high school students access online information sources to satisfy their information needs in the areas of learning, games, and entertainment (Grefins, 2011; Chang and Gomes, 2017). The Internet serves as a source for readily available information resources; and the availability of these resources online have been revealed as a motivation for students to seek information from it to solve their learning or research problems on any topic, as well as to improve their knowledge (Anyaoku, Nwafor-Orizu and Oguaka, 2015:153).

Seeking information on the Internet by students to solve problems in their daily life also promotes their sense of environmental mastery and increases their psychological well-being (Liu et al., 2013:26). Studies have shown that, most high school students use online sources to seek information for personal development and the process of seeking online information increasingly serves as their first option in their quest to access information for personal development (Soyemi and Mojisola, 2015:83; Swintter, 2013). It has therefore become natural for students to “use the Internet to conduct information-seeking activities regarding their studies or personal lives” (Gauducheau, 2016:44).

### **Searching and retrieval skills of students**

The Internet in recent years has provided easy access to enormous amounts of information and students have embraced this opportunity by increasingly accessing the Internet to get information (Kroustallaki et al., 2015:156). The Internet is offering abundant and diverse information, which

enable students not only to access up-to-date information but also to seek information of their own interests (Tsai, Hsu and Tsai, 2012:246). However, it has been indicated that, Google and the Internet in general is creating “a challenge for learners to determine what information is genuine” for selection and retrieval (Al-Aufi, Al-Azri, and Al-Hadi, 2017:1).

For modern students, the Internet and other online environments are a significant space of experience in their growth process (Borca et al., 2015:49). The worldwide Internet seems to be the main source of information for high school students (Malliari et al., 2014:272). They are therefore faced with the challenge and the responsibility of using the diverse strategies and skills that now “exist for the location, retrieval, handling, and dissemination of information” on the Internet (Sales, Pinto and Fernández-Ramos, 2016:3).

Internet-related functions have integrated into students’ daily lives and activities, and with the rapid proliferation of users, “evidence has begun to emerge suggesting that Internet use may fulfill different developmental needs” (Borca et al., 2015:49). The Internet and other online settings provide different and continuously available information which requires online information users to acquire the competence and the capacity needed to seek out online information that is based on knowledge, abilities and skills from the Internet (Sales, Pinto and Fernández-Ramos, 2016:3; Moskina, 2013:1). However, it has been found that, students apply skills that are inconsistent and irregular when searching for information from the Internet for assignments by moving between “newly acquired strategies to earlier, less effective ways of searching, reading and evaluating information” (Kroustallaki et al., 2015:157). This shows that, students “often lack the necessary skills to effectively use online resources” (Kroustallaki et al., 2015:156).

It has been reported that, students overwhelmingly rely on Google to the exclusion of many academic search tools in their quest to seek online information (King, 2014; Tsai, Hsu and Tsai, 2012; Kolowich, 2011). Students “see Google as being ‘the’ Internet and they use these two terms interchangeably, seeing them to be one and the same thing” (Julien and Barker, 2009:14). Asher, Duke, and Wilson (2013:473) confirmed in their study that, students treat “almost every search box like a Google search box, using simple keyword searches” in majority of their

searches on the Internet. Although students rely heavily on search engines for information searching, they need to be mindful that, search engines are very advanced in providing contextual and personalised results by combining explicit queries with implicit feedback (Koesten, Kacprzak and Tennison, 2016:2).

Internet searching is a “dynamic process that evolves over relatively short time periods” (Kroustallaki et al., 2015:157). The command as well as knowledge of information competence are therefore important for effective online information search, since these competences provide online information users the ability to achieve the “skills needed to know, on the one hand, how to define and structure an information need, by identifying the key concepts and the terms that describe the search profile” (Sales, Pinto and Fernández-Ramos, 2016:4). It also helps users to determine the needed information and the usefulness of the information; as well as how to manage the “strategies, techniques and tools for formulating the search and selecting suitable resources” (Sales, Pinto and Fernández-Ramos, 2016:4).

Although, King (2014:27) maintained that, different search strategies may be used by students when seeking information from the Internet, a study that employed students to experiment this dynamic process over a short period of time showed that students were likely not familiar with the process of searching for information from the Internet, since they were lacking the different skills needed for a successful search activity (Koesten, Kacprzak and Tennison, 2016:1).

Studies on exploring students’ Internet searching strategies mostly take advantage of two major categories: implicit and explicit strategies. An “implicit strategy is to have students self-reflect on their searching behaviors through a questionnaire or interview” during/after Internet searching tasks, while an explicit strategy refers to the usage of searching strategies to record directly “the user’s behaviors, such as observation and transaction logs” (Tsai, Hsu and Tsai, 2012:247).

Studies in the 2000s have focused especially on students’ “computer user discourse, typified by portrayals of ‘digital natives’ or the ‘net generation’”, and the notion of students or young people being confident and ‘expert’ Internet users has proliferated Western rhetoric for quite some time now (Furi and Balog, 2016:63). However, a number of studies have revealed that, students

lacked the competence and skills to effectively search and retrieve information from the internet (Singh and Mahapatra, 2016; Borca et al., 2015; Kadli and Hanchinal, 2015; Georgas, 2014; Malliari et al., 2014). It has been found that most students fail to use appropriate keywords when searching for information from the Internet (Dalal, Kimura, and Hofmann, 2015), since they often “encounter difficulty in specifying appropriate keyword terms and use” (Kroustallaki et al., 2015:157).

According to Sales, Pinto and Fernández-Ramos (2016:4) searching effectively for information on the Internet includes all the competences required for solving an information need once the knowledge gap has been identified. These competences include:

- knowing about the topic so as to be able to clarify and define the limits of the search profile;
- being aware of the scope required in terms of topic and time;
- having knowledge of the level of thoroughness/precision needed;
- having the right language to work with;
- using the right type of document needed; and
- employing the right types of search tools.

Students being exposed to online media early in life may have helped to develop good parallel processing skills; however, there are some drawbacks such as the overdependence on search engines and skills such as keyword search (Furi and Balog, 2016:64). “Contrary to the popular view, there is little evidence that young people are expert searchers or even that their search prowess has improved with time.” (Williams and Rowlands, 2007:9). For example, it has been reported that the search performance of students significantly worsens during unguided Internet searching especially among lower grades (Kroustallaki et al., 2015:157).

Similarly, a number of students are found not to use quotation marks when searching for information from the Internet, even if doing so would have improved the search results (Dempsey and Valenti, 2016:203). The simplest and most common techniques like "one keyword" are used very often by students when searching for information with advanced

techniques like ‘searching within results’ or ‘searching for similar results’ rarely used by them (Malliari et al., 2014:272-277).

Although, students prefer keyword searches, it has been found that most of them change terms when a search is unsuccessful, yet, their new choice for search terms most often “seemed little more than a guess” (Dalal, Kmura and Hofmann, 2015:671). For example, students who employ inappropriate keywords are often unable to consider synonyms and this makes them search with “colloquial or informal terms that are part of their everyday vernacular” (Dempsey and Valenti, 2016:204).

Moreover, students exhibit improper use of searching tools such as Boolean operators when searching for information on the Internet, yet only a few of them either express “confusion or frustration as to why the results did not change the way they expected” (Dalal, Kimura and Hofmann, 2015:670). It is therefore evident that students’ lack the skills and experience to construct efficient and sophisticated search strategies and a possible explanation for the relatively low level of search competence among students may be that they “acquired searching skills on their own, without any formal training, and as a result, they used the simplest and most common techniques for retrieving information” (Malliari et al., 2014:277).

As indicated, the Internet and other online tools are serving as prominent electronic information sources which are considered extremely important tools for effective teaching, learning, and research (Kadli and Hanchinal, 2015:67). Similarly, the range of content available on the Internet is so wide and this offers students the opportunity to pursue interests and expertise that otherwise would not be possible (Borca et al., 2015:56). However, a number of students are completely unaware that their search strategies are to “blame for the mismatched or unsatisfying results” they received during their search for information on the Internet (Dalal, Kmura and Hofmann, 2015:671). For instance, spelling errors have caused real problems for students when searching for information on the Internet and students who did not pay attention to a misspelled keyword, or were not aware that they have misspelled a term, had their results limited and potentially irrelevant (Dempsey and Valenti, 2016:203).

In order for students to effectively search and retrieve information from the Internet or other electronic sources, the students or information seeker is supposed to have sufficient knowledge and competence to retrieve the desired piece of information from the electronic resources available (Singh and Mahapatra, 2016:477). According to Sales, Pinto and Fernández-Ramos (2016:4), dealing with these requirements or competencies successfully requires the students to acquire the following:

- a set of core skills related to knowledge of the terminology of the subject matter;
- a sufficient command of suitable search strategies;
- the ability to access automated catalogues, databases and electronic sources of information;
- a command of strategies for searching for information on the Internet; and
- the ability to use informal sources of electronic information.

## **Results**

### **Gender of respondents**

This section shows the gender of the high school students who participated in the survey. A total of 322 students participated in the study. One hundred and fifty-four of the participants (47.8%) were males and the remaining 168 (52.2%) were females.

### **Age range of respondents**

Table 2 shows that the largest number of students, 89 (27.6%) of the respondents, were 18 years old, followed by students at age 17 with 86 (26.7%) respondents. This shows that, of the 322 respondents, more than half of the respondents were between 17 and 18 years old. Age 19 was third in rank having 58 (18.0%) respondents. The next two age groups were almost evenly divided between 16 years old and 20 years old: 44 (13.7%) and 41 (12.7%) of respondents respectively. The oldest age range of 21 years and above was represented by four (1.2%) respondents and this represents the lowest age range of respondents.

**Table 2: Age range**

**N=322**

<b>Age (years)</b>	<b>Count</b>	<b>Percent</b>
16	44	13.7
17	86	26.7
18	89	27.6
19	58	18.0
20	41	12.7
More than 20	4	1.2
<b>Total</b>	<b>322</b>	<b>99.9</b>

**Residential status of students**

This section indicates students' residential status. Out of the 322 learners surveyed, 292 of them representing 90.7% were boarders residing on their school campus and 30 of them representing 9.3% were day students. This attests to the fact that, majority of the students were residing at the boarding houses of their respective campuses. Table 3 shows a comparison of surveyed students' residential status and host schools of the study. Table 3 depicts that St. Louis SHS had no students residing off the school campus, Effiduasi SHS had 21 (6.5%) day students, and Simms had nine (2.8%) students residing outside the school.

**Table 3: A cross tabulation of host schools and students' residential status**

**N=322**

<b>School</b>	<b>Students' residential status</b>				<b>Total</b>	
	<b>Day</b>		<b>Boarding</b>			
	Count	Percent	Count	Percent	Count	Percent
St. Louis SHS	0	0	94	29.2	94	29.2
Simms SHS	9	2.8	104	32.3	113	35.1
Effiduasi SHS	21	6.5	94	29.2	115	35.7
<b>Total</b>	<b>30</b>	<b>9.3</b>	<b>292</b>	<b>90.7</b>	<b>322</b>	<b>100</b>

### **Internet connectivity and access at school**

This section provides information on Internet connectivity at the three schools. All surveyed students (100%) indicated in the questionnaire that their schools were connected to the Internet. The responses to the questionnaire by the surveyed students also highlighted that all the respondents, 322 (100%) were able to access the Internet at their schools. The responses further revealed that, almost all the students that participated in the study were accessing Internet from their school's computer laboratory. Accordingly, 321 of the respondents representing 99.7% indicated that the only place they could access the Internet was their schools' computer laboratories. Besides, the remaining one participant representing 0.3% was able to access the Internet at school from the cell / mobile phone.

### **Students' Internet exposure age**

Students were asked through an open-ended question to indicate the age at which they were exposed to the use of the Internet. The responses from the students depict that, majority of the students; 174 (54.0%) were exposed to the Internet at the age of 15 years; 67 (20.8%) of the students were exposed to the Internet at the age of 14 years; 53 (16.5%) of the surveyed students were exposed to the Internet between the ages of 10 years and 13 years; and 28 (8.7%) of the surveyed students were exposed to the Internet between the ages of 16 years and 18 years. It is important to note that, none of the respondents was exposed to the use of the Internet before the

age of 10 years. These responses attest to the fact that, most students were exposed to the Internet when they got to their current schools (high school).

### **Internet access on home computers**

The study found that 202 of the respondents, representing 62.7%, were having access to computer at home and the remaining 120 (37.3%) of the students were not having access to computer at home. Of the 202 students who indicated that they had access to a computer at home, 121 of them representing 59.9% indicated that their computers at home were connected to the Internet and the remaining 81 (40.1%) had their home computers not connected to the Internet. Table 3 presents a comparison between students' access to computer or Internet at home and students' Internet exposure age. The results from Table 3 depicts that out of the 41 (12.7%) respondents who were exposed to the Internet between the ages of 10 and 12 years, 31 (9.6%) of them had a computer with Internet access at home. Furthermore, 102 (31.7%) of the students who were exposed to the Internet between 16 and 17 years had neither computer nor Internet access at home. Table 4 clearly shows that learners who had Internet access at home were exposed to the Internet earlier than those that had no Internet access at home.

**Table 4: A cross tabulation of students' access to computer or computer with Internet at home and students' Internet exposure age**

**N=322**

<b>Students access to computer and Internet at home</b>	<b>Internet exposure age</b>								<b>Total</b>	
	<b>10-12years</b>		<b>13-14years</b>		<b>15-16years</b>		<b>17-18years</b>			
	Count	%	Count	%	Count	%	Count	%	Count	%
Computer with Internet access at home	31	9.6	68	21.1	17	5.3	5	1.6	121	37.6
Only computer access at home	8	2.5	7	2.2	62	19.3	4	1.2	81	25.2
No computer access at home	2	0.6	4	1.2	102	31.7	12	3.7	120	37.2
<b>Total</b>	<b>41</b>	<b>12.7</b>	<b>79</b>	<b>24.5</b>	<b>181</b>	<b>56.3</b>	<b>21</b>	<b>6.5</b>	<b>322</b>	<b>100</b>

**Table 5: A cross tabulation of how students seek online information and their age**

**N=322**

Ways of seeking online information	Age of respondents										Total	
	16 years		17 years		18 years		19years		20years+			
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Assistance from intermediary	7	2.2	13	4.0	2	0.6	3	0.9	2	0.6	27	8.3
Assistance from friends/colleagues	1	0.3	1	0.3	27	8.4	26	8.1	24	7.5	79	24.6
Self-browsing	35	10.9	72	22.4	60	18.6	29	9.0	19	5.9	215	66.8
Other	1	0.3	0	0	0	0	0	0	0	0	1	0.3
<b>Total</b>	<b>44</b>	<b>13.7</b>	<b>86</b>	<b>26.7</b>	<b>89</b>	<b>27.6</b>	<b>58</b>	<b>18.0</b>	<b>45</b>	<b>14.0</b>	<b>322</b>	<b>100</b>

Table 5 shows that, 215 of the students representing 66.8% were able to access the Internet by themselves, 79 of the participants representing 24.5% accessed the Internet with assistance from friends and colleagues, 27 of the participants representing 8.4% accessed Internet through the assistance of intermediaries such as teachers or librarians and the remaining one of the participants representing 0.3% indicated other support. The cross tabulation as depicted in Table 5 further shows that, 35 (10.9%) of the surveyed students at age 16 years were accessing the Internet themselves without needing any assistance, while 26 (8.1%) of the surveyed students at age 20 years and above needed assistance to access the Internet for online information. Clearly, the cross tabulation highlights that students at lower ages were able to access the Internet themselves as compared to students of older ages. Moreover, the cross-tabulation highlights that, the students of younger ages (16-17 years) preferred seeking assistance from intermediaries such as librarians or teachers as compared to students of older ages (18 and above) who preferred to seek assistance from their friends or colleagues when accessing information on the Internet.

### **Students' perception of their Internet searching skills**

Table 6 shows a cross tabulation of participant's responses in terms of possession of Internet skills and host schools. From Table 6, 271 (84.2%) of the respondents indicated that they possessed some peculiar skills needed to search for information on the Internet and 51 (15.8%)

of the surveyed students indicated that they did not possess the needed skills in searching for information on the Internet. The cross tabulation presented on Table 6 further shows that all the surveyed learners at St. Louis SHS perceived themselves to possess the skills needed to access the Internet for online information. However, majority of the surveyed learners who indicated that they did not possess the skills needed to access the Internet were from Simms SHS.

**Table 6: A cross tabulation of students' perceived possession of Internet skills and host schools**

**N=322**

Host school	Internet skills				Total	
	Yes		No			
	Count	Percent	Count	Percent	Count	Percent
St. Louis SHS	94	29.2	0	0	94	29.2
Simms SHS	81	25.2	32	9.9	113	35.1
Effiduasi SHS	96	29.8	19	5.9	115	35.7
<b>Total</b>	<b>271</b>	<b>84.2</b>	<b>51</b>	<b>15.8</b>	<b>322</b>	<b>100</b>

**Table 7: Students' online searching skills**

**N=322**

Searching steps	Always		Often		Sometimes		Rarely		Never		*No response		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Keyword search	161	50.0	33	10.2	73	22.7	8	2.5	41	12.7	6	1.9	<b>322</b>	<b>100</b>
More than one keyword search	122	37.9	52	16.1	101	31.4	12	3.7	32	9.9	3	0.9	<b>322</b>	<b>100</b>
Phrasal search	43	13.4	39	12.1	94	29.2	49	15.2	85	26.4	12	3.7	<b>322</b>	<b>100</b>

### **Students use of 'keyword search'**

The students' responses as presented on Table 7 shows that 161 of the respondents, representing 50% indicated that they 'Always' applied keyword search when retrieving information from the

Internet; 73 of the respondents, representing 22.7% were 'Sometimes' using keyword search for online information retrieval; 41 of the participants, representing 12.7% indicated that they had 'Never' applied keyword search for online information retrieval; 33 of the respondents, representing 10.2% were of the view that they 'Often' used keyword search when retrieving online information on the Internet; and eight of the surveyed students, representing 2.5% indicated that they 'Rarely' used keyword search when searching for information on the internet. Six (1.9%) of the respondents did not indicate a response.

### **Use of 'more than one keyword' search by students**

As depicted on Table 7, 122 of the respondents, representing 37.9% indicated that they 'Always' applied more than one keyword search for online information retrieval; 101 of the respondents, representing 31.4% indicated that they 'Sometimes' applied more than one keyword search when searching for online information on the Internet; 52 of the respondents, representing 16.1% were of the view that they 'Often' applied more than one keyword search for online information retrieval; 32 of the respondents, representing 9.9% indicated that they had 'Never' applied more than one keyword search for online information retrieval; and 12 of the surveyed students, representing 3.7% indicated they were 'Rarely' applying more than one keyword search when retrieving information from the Internet. Three (0.9%) of the respondents did not indicate a response.

### **Students' use of phrasal search**

Table 7 further reveals that 94 (29.2%) of the respondents 'Sometimes' applied phrasal search when retrieving information from the Internet; 85 (26.4%) of the surveyed students were of the view that they had 'Never' applied phrasal search for online information retrieval; 43 (13.4%) of the respondents 'Always' used phrasal search to retrieve online information on the Internet; 49 (15.2%) of the respondents were 'Rarely' using phrasal search for online information retrieval; and 39 (12.1%) of the surveyed students 'Often' used phrasal search when searching for online information on the Internet. Twelve (3.7%) of the students did not indicate a response.

**Table 8: A cross tabulation of students' school and use of advanced search option****N=322**

School	Use of advanced search option										Total	
	Always		Often		Sometimes		Rarely		Never			
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
St. Louis SHS	9	2.8	5	1.6	12	3.7	23	7.1	45	14.0	94	29.2
Simms SHS	15	4.7	7	2.2	16	5.0	14	4.3	61	18.9	113	35.1
Effiduasi SHS	20	6.2	11	3.4	27	8.4	19	5.9	38	11.8	115	35.7
<b>Total</b>	<b>44</b>	<b>13.7</b>	<b>23</b>	<b>7.2</b>	<b>55</b>	<b>17.1</b>	<b>56</b>	<b>17.3</b>	<b>144</b>	<b>44.7</b>	<b>322</b>	<b>100</b>

Table 8 shows that 144 (44.7%) of the respondents had 'Never' used an advanced search option when accessing online information on the Internet; 56 (17.3%) of the surveyed students 'Rarely' used advanced search options to access online information on the Internet; 55 (17.1%) of the respondents were 'Sometimes' using advanced search options for online information search; 44 (13.7%) of the surveyed students 'Always' used advanced search options for online information retrieval; and 23 (7.2%) of the respondents were of the view that they 'Often' used advanced search options to access online information when searching for information on the Internet. As depicted on the cross tabulation, learners from Effiduasi SHS were frequently applying the advanced search option as compared to learners of Simms SHS and St. Louis SHS.

**Table 9: A cross tabulation of gender and students that formulate sub-questions for online search****N=322**

Gender	Formulate sub-questions for online search										Total	
	Always		Often		Sometimes		Rarely		Never			
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Male	37	11.5	63	19.6	31	9.6	20	6.2	3	0.9	154	47.8
Female	76	23.6	47	14.6	26	8.1	14	4.3	5	1.6	168	52.2
<b>Total</b>	<b>113</b>	<b>35.1</b>	<b>110</b>	<b>34.2</b>	<b>57</b>	<b>17.7</b>	<b>34</b>	<b>10.5</b>	<b>8</b>	<b>2.5</b>	<b>322</b>	<b>100</b>

As depicted on Table 9, 113 (35.1%) and 110 (34.2%) of the respondents indicated that they 'Always' and 'Often' formulated sub questions when searching for information on the Internet; 57 (17.7%) of the respondents were 'Sometimes' formulating sub questions when accessing online information on the Internet; 34 (10.5%) of the surveyed students 'Rarely' formulated sub questions when searching for online information on the Internet; and eight (2.5%) of the students had 'Never' formulated sub questions when conducting online search. The cross tabulation presented on Table 9 clearly depicts that female students frequently formulated sub questions when searching for online information on the Internet more than their male counterparts.

## **Discussions**

Nkomo (2009:5) asserted that the infrastructure for Internet access in educational institutions is primarily located in the institutional libraries, computer laboratories, and offices. The responses from the participants indicated that, the only place the surveyed students could access the Internet at school was the computer laboratory. This study confirms Grimus and Ebner's (2016:14-15) study that found that students' Internet use in Ghana high schools is officially limited to the institutions' computer laboratories.

Moreover, high school students in Ghana are prohibited from the use of mobile phones in schools (Grimus and Ebner, 2016) and this has contributed to students' limited access to the Internet. Particularly, as found in this study almost all the students reside at their school campuses and therefore could access the Internet only at their institutions' computer laboratories. This situation shows that students' access to the Internet is not encouraging due to low number of computers and poor maintenance at the schools' computer laboratories (Akom, Asante and Adjei-Frimpong, 2016; Grimus and Ebner, 2016).

In contrast, a study by Shiweda (2013) found that, most high school students were accessing the Internet from their school libraries. Similarly, Lawrence and Miller (2000:30) had found in their study that the "Internet had become an essential component of every library, allowing it to

function as a gateway to vast reserves of dispersed information”. However, the findings from this study points to the fact that, students from the surveyed schools in Ghana had no access to the Internet at their school libraries.

A study by Czerniewicz and Brown (2010:367) revealed that, most students were exposed to the Internet at a very young age. The responses from the students in this study show that, more than two-thirds of them (241 students, representing 74.8%) were exposed to the Internet at the age of 14 years and 15 years. This shows that majority of the students started using the Internet when they got to high school. It is important to note that, none of the students was exposed to the Internet before the age of 10 years. This finding is in contrast with the findings of Herout, (2016) among students in Czech Republic as well as Malliari et al. (2015) among high school students in Greece that found that students were exposed to the Internet at early stages of their lives, mostly at primary school. Clearly, the findings of this study showed that access to Internet at home influences students’ Internet exposure age since students who reside in homes connected to the Internet were exposed to the Internet earlier than students who resided in homes that were not connected to the Internet.

The use of advanced search options help in conducting effective online search. It helps users to effectively gather and select relevant information from the Internet. A key advantage of the use of advanced search options is that, it defines the limits of the search. According to Sales, Pinto and Fernández-Ramos (2016:4), an effective online information search requires the competence of clarifying and defining the limits of the search profile. It is important to note that advanced search options help in the clarification and definition of search profiles. From the students’ responses, it was established that more than 60% (200) of the them were not (‘Rarely’ and ‘Never’) using advanced search options when conducting online information search. It was alarming to note that, 45% (144) of the students had ‘Never’ used the advanced search option. This confirms Malliari et al.’s (2014) study which found that most students rarely used advanced search options.

The most frequent and simplest technique that students apply when conducting an online search is the use of a "keyword" search (Malliari et al., 2014). Although this search technique seems the

most popular searching skill of learners, Dempsey and Valenti (2016:204) found that students whose keywords were inappropriate often failed to consider synonyms or more formal terms that likely would appear in college-level sources, and rather searched “colloquial or informal terms that are part of their everyday vernacular”. The results from the respondents highlighted that, half of the students (161 respondents, representing 50%) ‘Always’ used a keyword search when searching for information on the Internet. The surveyed students through their responses clearly highlighted that, the use of a keyword search was very popular among them since those who were not applying a keyword search were less than 16% (49 students). This confirms Malliari et al.’s (2014) study that found that the use of keyword search is the most frequently used technique among learners. A possible reason for students’ inability to apply advanced techniques could stem from the fact that students were not introduced to more advanced techniques at school.

## **Conclusion**

Information users are required to possess competence and skills in order to effectively and efficiently access online information on the Internet (Singh and Mahapatra, 2016; Malliari et al., 2014). The results from the study reveals that students’ access to the Internet is limited. The study highlighted that the Internet infrastructure at the surveyed schools were inadequate. Clearly, students’ access to Internet at the schools’ computer laboratories alone restricts their access to the Internet, since the number of workstations and laboratories available at the surveyed schools would not be enough to accommodate the students for Internet use regularly. The study advised that school Management and other stakeholders (e.g. Ministry of Education, community, Parent-Teacher Associations, etc.) help in providing additional workstations and computer laboratories to increase learners access to the Internet at school. Particularly, allowing students to use mobile/smart phones will help in complementing students access to the Internet.

The study has also found that students perceive their Internet competence level to be high since majority of the surveyed students were of the view that, they possessed the necessary skills needed to access the Internet for online information. However, the study has revealed that most of the students were not applying the strategies and techniques needed to conduct effective online search on the Internet. Particularly, the surveyed students have shown through their responses to the questionnaire that they over rely on the use of a keyword search technique at the

exclusion of other advanced search techniques. These findings on the searching skills of students through the responses of the participants confirm earlier findings that, learners lacked the skills and experience necessary to construct efficient and sophisticated search strategies (Kuiper et al., 2008; Aula, Khan and Guan, 2010; Nkomo et al., 2011; Dempsey and Valenti, 2016; Leeder and Shah, 2016).

The study has therefore highlighted that, students lacked certain skills needed for effective and efficient retrieval of online information from the Internet. It was clear that students needed online information to satisfy their academic and personal needs. However, their inability to employ advanced searching skills and techniques was a challenge. The study therefore recommends that, students be trained on advanced searching skills in order to develop and enhance their searching skills and techniques, e.g students could be introduced to Google Advanced Search for a start

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