Information literacy development and competencies of high school students in Accra

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Abstract

Purpose – Information literacy (IL) is clearly important for academic performance, as evidenced by literature. It could be defined as a set of abilities, attitudes and experiences that enable people to recognize when they need information to solve an issue. The importance of investigating students' IL competencies cannot be overstated. This study therefore aims to look into the IL development and competencies of high school students in Accra, as there appears to be a dearth of systematic study on this in Ghana.

Design/methodology/approach – To investigate this phenomenon, the study used a survey research design with a mixed-methods approach and a post-positivist research paradigm. A total of 454 high school students, 3 librarians and 3 heads of ICT departments from three senior high schools in Accra participated in this study. This study used two methods: an audit of the IL programmes and practices available at the selected schools as well as IL literacy assessment through the use of a standardized test instrument. The data collection tools used were a semi-structured interview schedule and a questionnaire.

Findings – This study found that high school students in Accra had low IL competencies. Again, the findings of this study revealed that inadequate infrastructure and lack of formalized IL instructions in schools hindered the IL development of students.

Originality/value – The author considers the study original both in conceptualization and design. The main question being interrogated stems from identified gaps in the literature and this study intends to fill these knowledge gaps. This study's originality also stems from the fact that there is a paucity of information on the subject of study in the context of Ghana. This study recommends the need to integrate IL in the school curriculum to ensure effective and efficient IL instructions in high schools.

Keywords Information literacy, Development, Competency, High school, Assessment, Instruction

Paper type Research paper

Introduction

Information literacy (IL) evolves throughout time as the internet continues to evolve and technology usage improves as people become more technologically savvy (Moto *et al.*, 2018; Whitmore, Agarwal and Xu, 2015). As a result, IL programmes are required to aid students in identifying the knowledge they require, selecting the appropriate information and applying it effectively to solve problems (Iskhak *et al.*, 2021; Lanning and Turner, 2010). According to the Association of College and Research Libraries (ACRL, 2016), IL could be defined as the set of integrated abilities that encompasses reflective discovery of information, the appreciation of how information is produced and valued, as well as the use of information in creating new knowledge and participating ethically in learning communities.

Faculty and librarians in tertiary institutions frequently raise concerns about arriving students' academic preparedness for the exigencies of academic tasks, owing to their wariness about high school students' IL skills (Dolničar *et al.*, 2020). University educators and other stakeholders, predictably, fault the high school education system for failing to sufficiently prepare students, implying that disparities in incoming student IL are a reflection of their secondary education (Saunders *et al.*, 2017).

Based on the 21st Century Skills Framework, students are highly expected to develop the needed competencies in IL to be successful in their academic pursuit (Scott, 2015). Certainly, to be effective and efficient in every endeavor in this technological era, students and employees should possess the skills to create, evaluate and effectively use information (Graves *et al.*, 2021; Reeve, 2016). Governments all over the world are busily calling on stakeholders including information professionals "to work together" to address the issue of IL due to its impact on nations' economies (Farmer, 2013, p. 174).

The International Federation of Library Associations and Institutions' (IFLA) advocates that, the development of IL skills should take place throughout students' lives, especially during their educational years, where teachers and librarians, as a part of the learning community and, as experts in information management, have or should assume the key role of facilitating IL. It is therefore of essence to look into the IL development and competencies of high school students to improve IL

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training at that level before these students advance to the tertiary level where possession of IL skills is highly critical for success.

Problem and need for the study

Through the emergence of the internet, Web-based information services have put wide impact on the provision of information services (Preedip and Vinit, 2011). The scope and volume of information on the Web requires good search skills such as the ability to formulate relevant keywords to find the information one is looking for. However, studies have found that students lack the skills and experience necessary to construct efficient and sophisticated search strategies, as well as to evaluate the retrieved resources (Leeder and Shah, 2016; Ngulube, 2010).

High school IL lessons attempt to prepare students for everyday information issues in today's technologically rich environments, as well as in academics and the workplace. IL-related topics can be located in a range of secondary school curriculum and syllabi, often intersecting with other technology-enabled literacy. However, many researchers and university educators have observed that IL instructions are not always carried out consistently, with acceptable coverage and at appropriate levels throughout secondary schools, according to their experiences with first-year university students (Dolničar *et al.*, 2020). Hence, the need to develop "information literacy setup to inspire students" (Haider and Ya, 2021 p. 91).

In Ghana, there appears to be a dearth of systematic study on the IL level of secondary school students. Notwithstanding the major worry about arriving university students' IL skills, few researchers have examined at the angle of IL instruction and aspirations from high school to university to see if IL is imparted in high school and if that teaching coincides with the requirements and tasks students face in their initial undergraduate years (Saunders *et al.*, 2017). This study examines these challenges by evaluating IL instruction provided in high school and identifying solutions to improve IL teaching practice.

The study therefore looks into the IL development and proficiency of senior high school students in Accra with the following research objectives:

RO1. Determining students IL competencies on a standardized test.

RO2. Ascertaining the infrastructure available for IL instructions in the selected schools.

RO3. Investigating the IL instructional practices available to students in the selected schools.

Literature review

Conceptualization of information literacy

IL can be described as a set of abilities, attitudes and knowledge required to understand when information is needed to assist in the solution of a problem (Jorosi and Isaac, 2021; Horton, 2007). The idea of IL has developed from traditional library skills, which highlights the finding of information sources, to information skills, which prioritizes the use of information methods (Haider and Ya, 2021; Kuhlthau, 2004). Many scholars' definitions of IL clearly show that "information seeking and use" are two crucial characteristics that are well recognized when attempting to define IL (Saunders *et al.*, 2017; Yu, 2014; Gross and Latham, 2012). IL, according to Zinn, Stilwell and Hoskins (2016), is a desired skill that allows people to find, organize and analyze information for better judgment and problem-solving.

IL consists of four primary components:

1. information access;
2. analysis;
3. assessment; and
4. content creation.

These four components are integrated to produce a skills-based approach to IL (Livingston, 2004). As a result, IL can be defined as the ability to access, analyze, evaluate and produce data in a variety of formats (Jorosi and Isaac, 2021; Adekoya, 2021; Christ and Potter, 1998). According to Horton (2007), an information literate person has the ability to express their information needs in searchable terms and language, then accurately search for, retrieve, describe and understand the information, organize it, assess its credibility and validity and assess its importance to make choices.

Information literacy competencies of high school students

According to several studies, too many high school students enter higher institutions without the IL abilities and habits that lead to successful learning (Graves *et al.*, 2021; Gekara *et al.*, 2021; Saunders *et al.*, 2017; Purcell *et al.*, 2012; Foster, 2006). For example, a study conducted by Stanford History Education Group (SHEG, 2016) among 7,804 high school and college students within an 18-month period concluded that "young people's ability to reason about the information on the Internet can be summed up in one word: bleak" (p. 4).

Unfortunately, there appears to be a gap between IL abilities taught in high school and skills required for a student to successfully conduct tertiary-level research, which causes students to struggle with transferring these skills once they enter postsecondary education. (Saunders *et al.*, 2017). As opined by Crawford and Irving (2007), high school students frequently get IL teachings in pieces, and these lessons may not be emphasized throughout their academic careers, adding to their low IL skills. By and large, the majority of high school students are entering university education without the IL abilities required to succeed. (Safdar and Idrees, 2021; Varlejs and Stec, 2014; Purcell *et al.*, 2012; Taylor, 2012).

Furthermore, learners with below-average IL skills have a distorted sense of their own competence: they do not realize things they do not know (Moreno-Morilla *et al.*, 2021; Gross and Latham, 2012). As reported in the SHEG (2016) study, high school students who are:

> Digital natives' may be able to flit between Facebook and Twitter while simultaneously uploading a selfie to Instagram and texting a friend. But when it comes to evaluating information that flows through social media channels, they are easily duped (p. 4).

Adolescents' use of the internet has risen steadily over time (Park *et al.*, 2021; Tzavela *et al.*, 2015). Because the internet provides users with an infinite amount of information to suit their information demands, most students naturally begin their research by browsing the internet (Mizrachi, 2010;

Herring, 2011). To support this claim, Lanning and Turner (2010) found that students are more comfortable obtaining and using material online. However, a study of the literature shows that young people use the internet frequently for their individual information needs, but they lack the IL competences to be productive in their information search (Zhu *et al.*, 2020; Tzavela *et al.*, 2015; Utz, 2015; Oeldorf-Hirsch and Sundar, 2015). As indicated by Zimerman (2012), although high school students may have "more than adequate computer skills, their relationship, via technology to information literacy may be underdeveloped" (p. 178).

Information literacy development in high schools

Students are expected to get interested in using a range of information sources to broaden their knowledge, solve problems, ask appropriate questions and hone their critical thinking skills as IL is developed in the classroom (Bergren and Maughan, 2020; Raish and Rimland, 2016; Ott, 2015; Huisman, 2015). This emphasizes the importance of students developing IL competencies to assist them in dealing with a variety of information-related concerns such as conflicting information, improper use of internet material, weakness to assess and synthesize information and abandonment of non-digital information sources (Thomas, 2004).

According to studies, the best IL program in schools is one that is integrated into the course curriculum rather than being separate from it (De Paor and Heravi, 2020; Chen *et al.*, 2014; Williams and Wavell, 2006; Breen and Fallon, 2005). As indicated by Plotnick (2000), IL development in school "is a process, requiring subject content; it needs to be integrated with the school curriculum; it is vital to success in school and life" (p. 28). However, this does not appear to be happening in most high schools, as most do not have IL instructions integrated in their curriculum, forcing students to teach themselves IL skills. Students are quite likely to indicate that they managed to learn IL skills from a colleague or classmate rather than a teacher or school librarian (Huisman, 2015; Gross and Latham, 2007).

The importance of incorporating IL training into secondary education is stressed, with IL learning outcomes incorporated into the high school curriculum (Malliari *et al.*, 2014). This is in line with IFLA's Guidelines on Information Literacy for Lifelong Learning (2010, p. 27), which state that schools must develop IL programmes as part of their curricula because IL requires continuous development at all levels of formal education, primary, secondary and tertiary, necessitating the need for school librarians. "to participate in a teaching course or recognized qualification to be part of the institutional information literacy endeavour".

Furthermore, studies show that school librarians are well-positioned to provide remedial IL instruction to provide students with the skills they need to succeed in their academic careers, and that students who had a school librarian in high school have better IL competencies (Huisman, 2015; Smalley, 2004). Clearly, development of IL and skills of students improves their academic achievements (Chen *et al.*, 2014; Ott, 2015; Yu, 2014).

Related studies.

The Educational Testing Service conducted an IL assessment in the year 2006 among 6,300 college and high school students from 63 schools and the findings show that only 14% of the participants were information literate (Foster, 2006). In Alberta, Canada, Smith *et al.* (2013) conducted a study on 103 high school students and their study found very poor IL skills among the students. The study pointed out that these high school students lack the needed searching skills and strategies to be successful in research. Similarly, a study by Dempsey and Jagman (2016) found that only 17 out of 70 high students are able to exhibit average to good IL skills.

A study conducted by Zhu *et al.* (2019 p. 261) among 2,127 high school students identified that "personal and teacher-related environmental determinants were the most important factors influencing teenage students' information literacy in China." The Pew Research Center conducted a study among middle and high school students and concluded that majority of high school students lack the skills to use advanced search tools, and that more than 90% of these students rely on Google for their online search (Purcell *et al.*, 2012). Varlejs and Stec's (2014) study among students from 143 different high schools found that students' IL development in high schools do not determine their IL success at college.

In Africa, a number of studies looking into high school students' IL competencies depict a gloomy picture. For example, studies in Kenya suggest that high school students lack the needed IL competencies (Kimani, 2014; Kavulya, 2003). Lwoga (2012) concludes that the IL skills and knowledge among students in Tanzania is still weak. In Ghana, studies have also found that IL skills among high school students are poor (Kankam and Nsibirwa, 2019; Yeboah *et al.*, 2017; Akom *et al.*, 2016).

Methodology

The study was conducted in three senior high schools from Accra – St. Johns Grammar Senior High School, Accra Senior High School and Kinbu Senior High Technical School. Accra is the capital city of Ghana, and it is noted to have schools with good structures, infrastructure and facilities. The academic performance of students in high schools in Accra are good comparatively, and this is partly due to the city's attraction to teachers and other professionals. The survey research design was used and it enabled the study to apply both qualitative and quantitative approaches to look into the IL development and competencies of the high school students. The use of the mixed-methods approach in the study provided richer insights and more understanding of IL issues among the students. The post-positivist research paradigm was also used for this study, as it is noted to be commonly associated with the mixed-methods approach.

The population of the study included all Senior High School three (SHS3) students, librarians and heads of ICT departments of the selected schools. Due to the Covid-19 protocols and restrictions established in the schools, the study was unable to apply random sampling, hence a convenience sampling was used for the students. It is important to point out that the selection of the three schools was partly influenced by the Covid-19 protocols and restrictions in schools. On the other hand, all the librarians and heads of ICT departments were included in the study (census), hence no need for selection.

To achieve the aim and objectives of the study, the study was conducted via two streams of methods:

1 IL audit; and
2 IL assessment.

Information literacy audit

This method of the study necessitates an audit of the IL programmes and practices available at the selected schools. This stage explored the perceptions and experiences of librarians and heads of ICT departments to investigate the effectiveness, efficiency and quality of support and infrastructure available for IL instructions in the selected schools. Through the use of semi-structured interview schedules, responses were solicited from three librarians and three heads of ICT departments and these six participants were coded P1 – P6 during the analysis and presentation of results. The data collected from the audit were analysed thematically through the use of NVivo software.

Information literacy assessment

The Information Competency Assessment Instrument (ICAI) was used to assess the IL skills of the students. The ICAI was developed to measure information competency taking the ten areas that were considered of common importance for an individual to be competent in IL. It is a self-report survey made up of 40 statements that are used to assess and rate respondents' feelings concerning each statement along a seven-point, Likert-scale ranging from strongly disagree (1) to strongly agree (7).

Validity is very important in showing that a research instrument measures what it intends to measure. Several studies have used this instrument to assess the IL competencies of students and have affirmed the validity of the instrument (Valenzuela *et al.*, 2019; Larsen *et al.*, 2010; Cantwell, 2010; Ferguson *et al.*, 2006). A recent study by Urra *et al.* (2021) used this instrument to measure IL competencies and concluded that the instrument is reliable, as the results from their study show "adequate levels of reliability" (p. 128). Moreover, Marshall (2006) used the instrument in two different studies and indicated that "with the Cronbach Alpha being in the high eighties and low nineties each time it is given shows consistent reliability" (p. 18).

For the purposes of this study, the ICAI was modified to suit the participants and the need of the study. For example, the Likert-scale range was reduced from 1–7 to 1–5, and the results were computed in percentages rather than the raw numbers. Thus, in determining the assessment ranking, the three rankings in the manual were maintained but converted to percentages. This implies that High information competence (IC) representing 205 score and above became 73% score and above. The Index of Consistency was used to validate the content validity of the survey. Cronbach's alpha was used to test the unidimensionality of the five-level agreement level questionnaire items and also used to measure the degree to which the variables were connected to one another to assess the internal consistency of constructs. The latent variables' reliability was found to be 0.813.

Data collection procedure and analysis

Due to the Covid-19 protocols and restrictions, some teachers of the three schools were recruited to assist in the data collection exercise. They served as the focal point for the students to collect and return the survey. Through the use of convenient sampling, the SHS3 students in the selected schools who were available and willing to participate in the survey collected, filled and returned the questionnaires. A total of 454 students from the three schools responded to the questionnaire. The analyses of the data were carried through the use of SPSS V.23. The use of the SPSS enabled the study to generate descriptive statistics

Results

Demographic data of the students

A total of 454 final year (SHS3) students from three senior high schools in Accra took part in the survey. The analysis of the data depicts that 242 (53.3%) of the respondents were male and the remaining 212 (46.7%) of the students were female. As shown on Table 1, majority (68.9%) of the students were between the ages of 16 and 18 while the remaining 31.1% were above 18 years of age. Clearly, this study could be said to have been conducted on teenagers. The school-wise distribution of the respondents as presented on Table 2 attests to the fact that St. Johns Grammar SHS had the highest number of students (166 representing 36.6%) responding to the survey. Moreover, the results from the study shows that the programme of study of majority of the respondents (55.9%) was General Arts while 41 (9%) of them were studying Science programme (Table 3).

Information competency assessment results summary

The ICAI measures information competency based on key areas that are considered of common importance for a person to be information literate. The individual scores from the ICAI are used to rank participants based on the three rankings in the manual of the instrument –High IC, Medium IC and Low IC.

Table 1 Age of participants (students)

Age	Frequency	%
16	60	13.2
17	94	20.7
18	159	35
19	81	17.8
20	35	7.7
above 20	25	5.5
Total	454	100

Table 2 Number of participants (students) from selected schools

School	Frequency	%
Kinbu Senior High School	135	29.7
Accra High Senior High School	153	33.7
St. John's Grammar Senior High School	166	36.6
Total	454	100

Table 3 Participants' programme of study

Programme	Frequency	%
General Arts	254	55.9
Science	41	9
Business	74	16.3
Visual/Home Economics	85	18.7
Total	454	100

The results from the assessment (Table 4) depict poor IL competence among the participants. Based on the rankings assigned by the ICAI manual, less than 6% (25 students) of the respondents achieved High IC with a significant number of the participants (41.6%) demonstrating low IL competence. The assessment's mean score of 52.2% and median of 54.1% show an overall poor information competence among the participants. It is therefore not surprising that the ranking of the results shows that majority of the participants (52.9%) were ranked on Medium IC where the rank accepts scores ranging from 54% to 72%.

Information competency assessment content analysis summary

Content analysis was conducted to appreciate the strength and weakness trends of the participants in respect of the key areas of the survey. There were five key areas that this study focused on to determine the information competencies of the participants. Each area has items that measure it. For example, under topic identification area, statements "When given a class assignment, I feel confident determining what topic I need to search," "I can take a complex assignment topic and break it down into more useful, simpler items" among others are used to measure; under locating and retrieving information area, statements "I know how to broaden or narrow an online search using Boolean operators (AND, NOT and OR)," "I know how to access information from the internet" among others were used for the measurement.

The analysis of the results based on these five key areas as presented on Table 5 shows very poor information competence among the students in respect of three of the key assessment areas – locating and retrieving information, evaluating information and presenting information. Particularly, about 36% of the respondents demonstrated very low information competence in the area of information searching and retrieval as well as almost 30% of the students demonstrating very low information competence in the area of information evaluation. On the other hand, the participants demonstrated appreciable level of information competence in the areas of topic identification and information sources. Specifically, almost 25% and 23% of the respondents demonstrated High IC in the areas of topic identification and information sources, respectively.

Moreover, item analysis was conducted so as to best understand where students struggled and gained most in the assessment. The item analysis of the results shows that the item in the assessment that majority of the students demonstrated very high IC is participants been aware that they could access information from the library and internet for their class work and assignments. It was refreshing to appreciate from the results that 387 (85.2%) of the participants demonstrated High IC in respect of the library and internet as information sources (Figure 1). On the other hand, majority of the students (337 representing 74.2%) demonstrated very low information competence on the use of Boolean operators (Figure 2).

Information literacy audit results

The results from the IL audit emanate from the interviews conducted on the six participants (3 librarians and 3 heads of ICT departments) from the selected schools. The study used a semi-structured interview schedule for the purposes of looking into the IL programmes and practices available at the selected schools. This audit enabled the study to achieve its objectives two and three.

RO2: Ascertaining the infrastructure available for IL instructions in the selected schools.

In terms of infrastructure, the study's findings revealed that each of the three schools had well-equipped ICT laboratories that were open to students. Furthermore, all of the selected schools were connected to the internet through the Ministries of Communications and Education's Free Wi-Fi to Schools programme. All areas of the campuses were connected to the internet including the libraries, classrooms and ICT laboratories. However, students could only access the internet at the ICT laboratories because they were not allowed to use their personal electronic gadgets (phones, tablets) on campus.

> The government through the ministry have provided for us WiFi facilities. All the computers in the ICT laboratories are connected to the internet and the students have access to them. Teachers and staff are also able to use the Wifi to connect their personal gadgets for teaching and learning in the classrooms and offices (P3 indicated).

> The only place students can access the internet for their academic works is the ICT laboratories. The computer in the library is to aid in the work of the librarian and as you can see there aren't any installed desktop computers in the library for students. Fortunately for this library, the school has provided us one laptop and I do loan it to students whenever necessary to use inside the library for their studies (P1 asserted).

Specifically, the study found that there were 50 computers available to students for use at St. Johns Grammar Senior High School, 30 computers (19 laptops and 11 desktops) available to students for use at Kinbu Senior High Technical School, and

Table 4 ICAI Score distribution

School	Ranking			Total
	High IC	Medium IC	Low IC	
St. John's Grammar Senior High School	7 (4.2%)	87 (52.4%)	72 (43.4%)	166
Kinbu Senior High School	8 (5.9%)	74 (54.8%)	53 (39.3%)	135
Accra High Senior High School	10 (6.5%)	87 (56.9%)	56 (36.6%)	153
Total	25 (5.5%)	240 (52.9%)	189 (41.6%)	454

Table 5 Content analysis

Key assessment areas	Ranking High IC	Medium IC	Low IC
Topic identification	112 (24.7%)	313 (68.9%)	29 (6.4%)
Information sources	104 (22.9%)	292 (64.3%)	58 (12.8%)
Locating and retrieving information	26 (5.7%)	267 (58.8%)	161 (35.5%)
Evaluating information	67 (14.8%)	260 (57.3%)	127 (27.9%)
Presenting information	97 (21.4%)	248 (54.6%)	109 (24%)

Figure 1 Library and internet as information sources

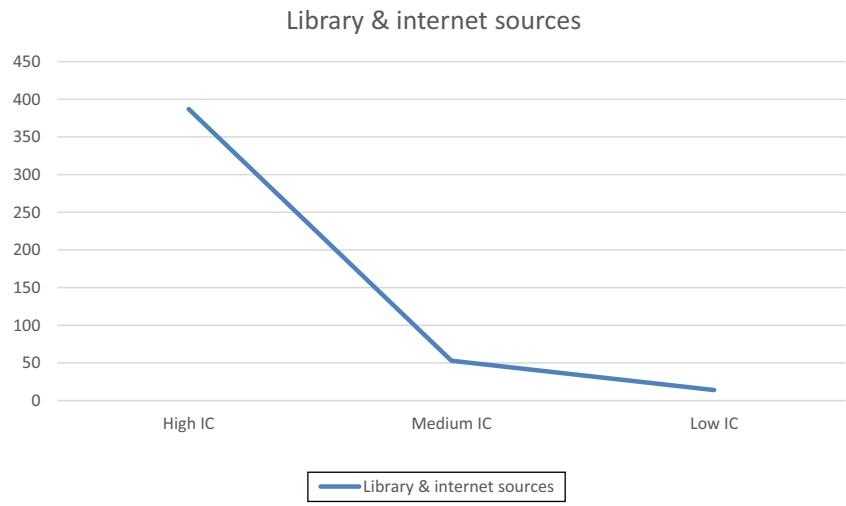
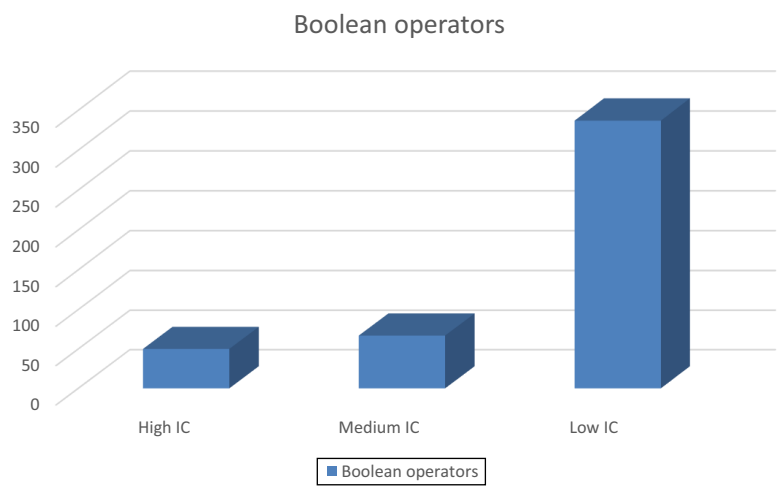


Figure 2 The use of Boolean operators



41 computers available to students for use at Accra High SHS. It is important to indicate that all these computers were connected to the internet.

The study was further interested in ascertaining whether or not there were policies and documents available in the schools for IL instructions, and it was revealed from the interviews that the selected schools had no policy on IL instruction, and that no documents were available for the schools on IL. The only documents that were used by the ICT teachers for training the students on ICT were the ICT syllabus. Regrettably, the libraries in the selected schools had no policy or document towards IL instruction.

RO3: Investigating the IL instructional practices available to students in the selected schools.

In relation to IL programmes and instructions, the results of the study attest to the fact that none of the three schools had a formal IL programme designed or instituted for the students. Particularly, IL instruction was not embedded in the

curriculum for the schools. Clearly, formal instruction that was available to the students was computer literacy which was well embedded in the ICT curriculum as well as "library period" for independent study in the library featured in students schedule or "timetable."

> We teach and train students on the use of computers and to some extent the use of the Internet. I must say that the questions you are asking me on Boolean operators and searching skills have no place in the syllabus so we don't take the students through them. Generally, for their studies, the students are able to use the computers very well but for the purposes of research, it is very poor (P3 revealed).

> Although we don't have a programme in place for information literacy instruction but we do so in one way or the other. For example, the Ministry of Education have provided to us an online academic portal called iCampus and we train students on how to use it. The iCampus portal is a platform that provides access to online books, videos and other documents on core subjects and some elective subjects. We assist students to create their personal accounts on the platform and train them on how to use it. I am sure this is part of information literacy (P5 opined).

The results from the study further show that the libraries had no programme in place towards IL instruction. The librarians were found not to offer IL training to the students. Regrettably, the libraries in the selected schools were not serving as IL instruction center for the students. The study found two major factors that hinder IL development in the selected schools: curriculum and infrastructure. For example, the librarians revealed that based on the structure of the schools and their curriculum, the libraries were positioned towards reference services. Moreover, the heads of the ICT departments during the interviews indicated that the computers available for students were not enough to serve the students.

> In this school like all others, we offer formal education and the syllabus is key in instructional delivery so we teach students based on the contents of the syllabus. Let me remind you that students would be examined by WAEC based on the contents of the syllabus for their WASSCE [. . .]we're unable to teach the students what you are asking because the ICT syllabus doesn't cover them (P3 said).

> The computers are not enough for the students and we need to ration the use of the computer laboratory by the students. Some of the students may have access to the computer lab once or twice within a semester due to the number of classes we have. Additional ICT laboratory would improve the practical lessons for the students (P4 noted).

> I am not part of the teaching staff so my responsibilities in the school are to manage the library and make reference materials available to the students. I offer help to students when they visit the library and most of these are reference services. . .when students face difficulties in their iCampus and other online needs, they report them to their ICT teachers (*P1* asserted).

Discussion

The Information Competence Assessment Instrument was used to assess the IL competencies of students form the three selected high schools in Accra and the results from the assessment show a very poor IL competencies of the participants. Based on the rankings recommended by the ICAI manual, less than 6% of the students attained High IC representing an advanced proficiency. The results of the study should be a concern for information professionals and lecturers since these students would be progressing to the tertiary soon. Particularly, the mean score from the assessment stood at 52.2% which obviously places the competencies of the participants at Low IC. The findings from this study seem not surprising since earlier studies have demonstrated low IL proficiency among high school students (Saunders *et al.*, 2017; SHEG, 2016; Purcell *et al.*, 2012; Foster, 2006).

It has been found that students apparently struggle to articulate their information needs but retrieving the information they require is even a greater challenge. In respect to this study, the results confirm that participants were highly challenged with information retrieval, as about 36% of them demonstrated Low IC in locating and retrieving information. This corroborates the findings of earlier studies in Ghana that found that high school students lack the needed information retrieval skills to be successful (Kankam and Nsibirwa, 2019; Akom *et al.*, 2016).

Although a number of studies have found that students were unable to articulate their information needs (Saunders *et al.*, 2017; Grefins, 2011), it was refreshing that majority of the students from the selected schools based on the results of this study demonstrated medium to high IC in respect of articulating their information needs since less than 7% were ranked Low IC in Topic identification. The item analysis of the results clearly shows that students appreciate information sources that are introduced to them in school. The key sources introduced to the students in school as highlighted based on the item analysis are the library and the internet. Particularly, the analysis established that students were familiar and regularly consulted these sources.

High school students are challenged with the use of advanced searching tools such as Boolean operators and studies have concluded that these students lack the competencies and experience necessary to construct efficient and sophisticated search strategies (Leeder and Shah, 2016; Dempsey and Valenti, 2016). Participants of this study were not exception since the results from the study prove that the use of Boolean operators is the element that students scored the highest Low IC. Specifically, over 74% of the participants attained Low IC in the use of Boolean operators.

Although the students demonstrated low proficiency level in information retrieval skills, this seem not surprising based on the results from the IL audit. It was found from the audit that the students were not taught these searching skills and strategies in school. Particularly, IL instructions were not embedded in the school curriculum and thus, were not offered in the selected schools. Implicitly, students may have to learn these skills themselves or from their colleagues. This situation confirms earlier studies that found that students in high schools were more likely to teach themselves IL skills rather than receive such training from a teacher or school librarian (Huisman, 2015; Gross and Latham, 2007).

A key ingredient for the development of IL competencies of students is infrastructure. Poor ICT infrastructure in schools negatively affect ICT and IL instructions in less developed countries in Africa and other parts of the world. The results from this study attests to the fact that lack of sufficient infrastructure coupled with lack of IL policy and programmes are hindering the effective development of IL instructions in the selected schools. However, it is important to point out that the results from this study depict improvements in ICT infrastructure available to high school students in Ghana. Particularly, the study has revealed that the "free WiFi to schools" programme have currently made it possible for the schools to experience uninterrupted access to the Internet. In contrast, earlier

studies in Ghana had found lack of internet access in high schools (Yeboah *et al.*, 2017; Buabeng-Andoh and Yidana, 2015). Earlier studies have found that students who had a school librarian in high school have better IL competencies (Huisman, 2015) but the results of this study show otherwise, as the librarians in the selected schools were found not to contribute to the IL development of the students.

Conclusion

In this digital age, the need of assessing students' IL skills cannot be underestimated. IL will be a critical component of high school students' success as they prepare to enter university education. According to the findings of this study, high school students in Accra require more IL teaching to develop their IL skills. The study has shown that the participants had very low IL competencies, which should concern academic librarians and academics because the study participants are scheduled to enter higher education shortly. The findings demonstrate that high school students lack the necessary skills for retrieving and evaluating information especially lack of skills in the use of Boolean tools.

Furthermore, the findings of this study have established that a lack of adequate infrastructure, as well as a lack of IL policies and programmes, are impeding the effective growth of IL instruction in the surveyed schools. Because IL lessons were not part of the school curriculum, they were not available at the selected schools. Despite the fact that internet connectivity (free Wi-Fi) was provided throughout the school campuses, the findings show that students' access to the internet was limited to their school's ICT laboratories because mobile phones were not permitted in schools.

Implications

In terms of practical implications, the study establishes the significance for the Ghana Education Service and other stakeholders to implement policies that promote and strengthen IL competencies among high school students. To promote successful and efficient IL development of high school students, IL programmes must be designed and thoroughly incorporated into the school curriculum. Moreover, the results of the study show the need for high school students to be allowed to use the internet via their mobile phones and other devices to supplement the limited infrastructure available to them for IL development. Again, efforts should be made to position the school libraries in high schools as IL instruction centers, with school librarians well-trained and equipped to spearhead IL.

In many ways, this research has broadened the theoretical horizon. For example, the findings of the study show that high school students in Accra have inadequate IL skills, and that IL instruction properly integrated into the school curriculum will result in positive outcomes. This study has once again emphasized the obstacles to successful IL instruction in schools, as well as expanded the discussion on high school students' use of smart phones in the classroom.

Limitation and recommendation for further studies

The study has limitation by exploring the IL development and competencies of high school students in only three schools in Accra, whereas employing many schools for the study would produce a better understanding of the phenomenon. The study recommends the need for further studies on this phenomenon to extend to many high schools in Accra, especially when the Covid-19 restrictions are eased in schools.

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