Volume 2, Issue 1 (2024)
(ISSN: 3005-4923)
KLISC Journal of Information Science and Knowledge Management

Enhancing information literacy skills of undergraduate medical students : a curriculum and policy analysis

DOI: 10.61735/gchda352

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ABSTRACT

With the growing size and complexity of library collections coupled with the explosion of medical information in diverse formats, medical students require competencies in identifying, locating, retrieving, evaluating, synthesizing, and effectively utilizing information. There is a need, therefore, for medical students to acquire Information Literacy Skills (ILS) to master content, extend their investigations, and become more self-directed and life-long learners. The objectives of the study were to: examine the ILS curricula in place to facilitate the delivery of ILS among medical undergraduate students at Moi University and the University of Nairobi, and to assess the methods used to enhance the delivery of ILS among medical undergraduate students at Moi University and University of Nairobi. A pragmatic research paradigm with a mixed-methods approach was employed in the study. The study adopted a descriptive survey design applied within a multiple case study, combining concurrent triangulation in data collection and analysis. The target population was 685 students comprising 6th-year medicine, 5th-year dentistry, and 4th-year nursing students, and 182 lecturers. A combination of stratified simple random and purposive sampling techniques was employed to obtain 353 medical undergraduate students, 62 lecturers in medicine, dentistry, and nursing specializations, 2 university librarians, 2 heads of medical librarians, and 6 heads of departments. Data was collected using questionnaires and interview schedules. Quantitative data was analysed using descriptive statistics and presented using frequency distribution tables and bar charts while qualitative data was analysed thematically based on the objectives and research questions and presented as narrative. The findings revealed that although ILS curriculum and policy were available, there was little implementation and accountability, indicating that the ILS curriculum and policy had not been reviewed to incorporate contemporary ILS. The study concluded that students had not acquired sufficient ILS competencies due to a combination of factors such as poor perception of ILS, low pedagogical expertise among ILS trainers, and absence of sustainable ICT infrastructure to facilitate the acquisition and utilization of fourth ICT revolutions' competencies. The study recommends that institutions of higher learning introduce four ILS credit-scored course units.

(Key words**: information literacy skills; skills adequacy; curricula development; pedagogy; medical undergraduate students; self-directed learning; life-long learning.**)

I. INTRODUCTION

People in all aspects of life need information. Information is a crucial resource that is characterized as processed material that aids in decision-making, broadens one's knowledge and mental capacity, and alters a society's overall status (Ukachi, 2015). Information is considered crucial for decision-making and effective operation at all levels of any undertaking (Adekunle, 2019). To effectively utilize information an individual requires ILS competencies (Caffrey et al, 2022),

According to Bruce et al (2022), ILS is the ability to locate, obtain, analyse, and utilize information. Similarly, the American Library Association (ALA) (2020) defined ILS as having the capability to identify when information is wanted as well as to find, assess, and apply it appropriately. ILS is viewed as a tool for community and individual empowerment in the twenty-first century. Additionally, the ability to recognize when information is needed has been defined as ILS by Dahlqvist (2021) as being aware of when information is required enables one to locate, retrieve, evaluate, and use it efficiently to either carry out further study or address the issue for which it was intended. The foundation of lifelong learning is ILS, which permeates all academic levels, learning contexts, and disciplines. Furthermore, ILS aids students in developing greater self-direction and control over their education, topic comprehension, and study breadth (Dahlqvist, 2021). The success of information literacy in

an individual is determined by the individual's agility and how well they utilize learned ILS (Baro et al, 2013).

Studies by Emerson et al (2021), Mudave (2016), and Diehm and Lupton (2014) argue that ILS enables students to obtain and utilize information to address specific issues in their study discipline. ILS, therefore, calls for the know-how to recognize, find, assess, and manipulate information ethically and for lifelong learning. From these definitions, ILS can depict to mean the prowess to recognize when one is deprived of information. In a rejoinder to the deprived state, one locates, critically analyses it, and uses it for research and long-life learning.

ILS in medical education around the world

According to Ankamah (2021), ILS is crucial for the implementation of a Problem Based Learning Curriculum (PBLC) training program that is used in United States (US) medical schools. Additionally, Ankamah (2021) notes that PBLC has been embraced by many medical schools as an active learning strategy that fosters students' logical reasoning and skills for solving problems, these are key tenets of ILS. Moreover, in the US, the Association of College and Research Libraries (ACRL) under the guidance of ALA in the year 2000 developed information literacy competency standards for higher education (ACRL, 2000). The upshot is that the medical curriculum in the US now follows the ILS framework of the ACRL, which emphasizes meta-literacy and the capacity of students to become not only information consumers but also creators and active participants (ACRL, 2016; Wenger, 2014).

Relatively, higher education institutions in Canada have elected to follow the ACRL, 2016 guidelines for their ILS instruction and implementation in their education institutions, because of the absence of in-house ILS innovation (Goff, 2017). Medical schools in Canadian universities have made ILS training in line with ACRL's fundamental tenets in the teaching of medical students. According to Pines, Julien, and Boon (2015), individual skills gain is the most direct and commonly acknowledged advantage of a high degree of ILS among students in Canada because they can search for information in various databases of scholarly work and write correct citations of sources. Correia, (2022) asserts that medical students are better equipped to handle the evolving information requirements occurring within the medical discipline of study thanks to lifelong ILS learned.

In the United Kingdom, according to the ACRL, (1977), ILS has been practiced as user education at universities. Additionally, according to Ashipala & Livingi, (2021), ILS has been included in information technology skills throughout the history of university education. Furthermore, the Seven Pillars of Information Skills for Higher Education framework that was advanced by the Standing Conference of National and University Libraries (SCONUL) in 2011 has been adopted as guidelines for ILS training by medical schools in universities in Britain and Ireland. (SCONUL, 2011),

In China, Batool, (2021) states that ILS in medical training institutions has been advocated by librarians. In addition, ILS seminars, credit-bearing units, and webinars have been introduced to facilitate ILS adequacy among students in Chinese universities Additionally, national ILS events and symposia have been used to raise awareness of the importance of ILS among medical professionals across China (Lawal, 2013).

In Africa, educational institutions in many nations have launched ILS programs designed to give students adequate ILS competencies to effectively utilize information (Mundave, 2016). Nevertheless, according to Shibambu & Mojapelo (2024), ILS initiatives are yet to be taken seriously or put into practice in many African nations. Among all African nations, South Africa is ranked number one for ILS training in higher education institutions (Ramabina & Ndou 2023). After the establishment of the Unity Government in South Africa in 1994, improving the literacy levels of citizens was seen as a priority. As a consequence, information literacy skills were recognized as a key to low literacy levels among South Africans (Nichols & Stornaiuolo, 2019). To raise the level of literacy among the populace, several initiatives aimed at developing ILS levels were launched. Consequently, the higher-education institution's ILS policy framework was adopted. The strategy was founded on three policy areas that have been authorized and synchronized in higher education institutions to train ILS personnel which are policies for education, ICT, and libraries and information services. In Ghana, several initiatives to train ILS in medical schools in the form of computer skills, library user education, communication skills, and media skills have been enacted according to Ankamah, & Gyesi (2021). However, Baer (2021), states that inadequate qualified staff to train ILS, absence of collaboration, inadequate ILS curriculum and policy guidelines, insufficient technological support and/or infrastructure, and inadequate time allocated to the ILS training, continue to impede the full realization of ILS potentialities in Ghana's medical schools.

In Kenya, the Commission for University Education (CUE) developed information literacy standards and Guidelines in 2014 (Njoroge, 2020). The guidelines stipulate that university libraries must design and manage

information literacy skills courses in their universities, incorporating the development of IL policies (Njoroge, 2020). However, the CUE instructions are brief and do not provide particular parameters to guide the operations (Kanguha, 2018 & Mugambi, 2013). Furthermore, the Kenya Medical Practitioners and Dentist Board (KMPDB) ensures that ILS is integrated into the medical training curriculum. KMPDB is a statutory body formed by Kenyan statute Cap 253 of the laws of Kenya to oversight medical education training. KMPDB is tasked by the Act with ensuring that medical students complete their training with the requisite knowledge and skills. ILS has been named by the Act as a key ingredient in educating qualified medical professionals in Kenya (KMPDB, 2019).

Statement of the problem

Medical training and practice require students to update their information continuously for evidence-based medicine (Withorn et al, 2020). However, the growing size and complexity of library collections coupled with the information explosion and the rapid pace of developments in ICT pose a challenge to medical trainees. Toroitich, Onderi, and Bobdalton (2018) study on the utilization of ILS among undergraduate students at Maseno University, points out that among the barriers to the efficient utilization of information especially in developing countries is the relatively low level of information literacy skills. Without the ability to manipulate and use information effectively, investments in both print and electronic-based resources may be a waste. Similarly, Nand & Sharma (2019), Mugambi, 2017; and Horo (2016) corroborate this claim by stating that although lots of information resources and services are available in Kenya, they are not fully utilized due to a lack of information literacy skills.

Chetty (2018) and Sutton & Johnson (2014) echo these sentiments by asserting that most medical students are unable to refine search strategies, criteria for selecting search terms, and appropriate information used to avoid plagiarizing published scientific works. They cannot also apply their acquired information literacy skills to assess the reliability of online information sources. Additionally, the ILS of undergraduate students pursuing medical-related courses is dependent on their capability to think critically and analytical problem-solving competencies. Mundave (2016) asserts that students studying medicine require critical discerning skills because medicine is an inquiry-based discipline. Critical thinking and problem-solving are key tenets of ILS.

Objectives of the study

The general objective of the study is to examine the information literacy skills curricula and policies supporting delivery of ILS to medical undergraduate students at the two universities

The objectives of the study were to:

i) To examine the ILS curricula in place to facilitate the delivery of ILS among medical undergraduate students at Moi University and University of Nairobi.
ii) To assess the methods used to enhance the delivery ILS among medical undergraduate students at Moi University and the University of Nairobi.

Theoretical framework

This study was guided by the six frames for the information literacy education model, which was developed by Christine Bruce in 1997 as a learning-oriented approach to ILS (Bruce, Edwards & Lupton, 2015). The six frames for the information literacy education model were created as a theoretical tool to assist participants in the ILS education arena in reflecting on and analysing the many implicit and explicit theoretical impacts on their settings. The frames have resulted in a paradigm change in ILS teaching, learning, and curriculum development (Pratt et al, 2008; Toohey, 2009).

The six frames of information literacy education are:

i) the '*content'* frame,
ii) the '*competency'* frame,
iii) the '*learning to learn'* frame,
iv) the '*personal relevance*' frame,
v) the '*social impact*' frame, and
vi) the '*relational'* frame.

According to Bruce, et al (2006), the 'six frames' theory is interested in ILS content and how that content is delivered, seen or experienced by learners.

This study utilized frame six – '*relational*' frame because it mediates the content, learning to learn, and experiential frames to guide the designing of an ILS policy and curriculum. These were the focus of the study.

The frame (six) is focused on how learners are aware of ILS or certain relevant phenomena related to ILS. It focuses on creating experiences that assist learners in discerning more powerful ways of viewing the phenomenon under consideration. Furthermore, this frame incorporates reflection as one of the strategies for

encouraging learners to understand complicated variations of phenomena.

II. ASSESSMENT AND EVALUATION OF ILS IN HIGHER LEARNING INSTITUTIONS

Withorn et al (2020) and Anandhalli, (2018) state that institutions of higher learning should conduct ILS assessments to ascertain the effectiveness of their ILS curriculum in attaining the objectives set in the curricula which among others is to effectively improve the ILS of undergraduate students. Anandhalli, (2018) defines three kinds of ILS evaluation methodologies based on whether the goal is to examine what learners have learned or their perception of ILS learning. The evaluation methodologies are the prescriptive or diagnostic methods used to test students' knowledge and skills before instruction. Examples include conventional assessments and a review of a student's previous work. The formative evaluation approach evaluates how well learners perform and gives comments whilst training is taking place. Based on the comments, the trainer can alter methods of instruction as the class develops. Examples include drafting brief reflection/reaction essays in response to a reading task. Finally, when education is completed, the summative evaluation approach is used to assess what has been learned. Some examples involve queries with multiple choices. According to Hoffmann and Labonte (2012), ILS assessment and evaluation techniques involve quizzes, questionnaires with multiple choices, evaluation of portfolios, self-evaluation essays, simulations, observation, final grades, group discussions, and courses that require students to synthesize and use their knowledge through essays and reflective thinking. From the literature, it is clear that there is no formal agreed method for effective ILS assessment and evaluation.

Bombaro (2014), asserts that librarians have influenced the introduction of ILS programs since they are the specialists in the majority of ILS tasks that are related to the knowledge domain. According to Bedford (2021), attempts to incorporate orientation, user instruction, or library training have not been effective in producing an all-around individual patron who can locate, assess, utilize, produce, arrange, or exchange information. Therefore, before implementing an ILS curriculum, Bedford (2021), proposes conducting a user information literacy requirements survey to help develop an ILS curriculum that will help students acquire these abilities. Bruce, Edwards & Lupton (2015) avers that Bruce's Six frames model through the relational variable states that developers of an ILS curriculum ought to consider ILS as a set of several information-interacting methods which are objective, subjective, or transformational.

Equally, Baro et al (2013) provide two ways for constructing ILS curricula, namely integrated curriculum and compartmentalized curriculum. In the compartmentalized curriculum, ILS is imparted as a separate subject that can be found in the curricula at all academic levels. This model's courses often emphasize the early phases of the ILS paradigm, including recognizing the information required, locating that information and examining the information sources, content assessment, and applying information morally and lawfully for a given endeavor. While the integrated curriculum covers information skills in multiple fields of study and extracurricular activities. Correspondingly, the relational variable in Bruce's Six Frames Model, ILS curriculum content should assist students in finding fresh perspectives on a given phenomenon.

Additionally, Benallack & Rundels (2021), observe that several university students are unable to select the most appropriate sources or databases related to their studies and that they need assistance in using the internet, especially in the formulation of search strategies and evaluation of what they find. When they go to search for titles, they are ignorant about the author, title, or subject entries which should be used as access points either in the automated catalogue (OPAC) or manual catalogue. Others are unaware of the most appropriate databases applicable to their disciplines (Kingori, 2015), for example, MEDLINE for those interested in medical issues. Experienced library users in automated databases are familiar with the Boolean logic principle which consists of three operators: OR, AND, NOT. However, Kingori (2015) alludes that students cannot use this logic unless they are taught. This can be achieved through analysis of key concepts of a given topic to enable them come up with searchable terms or subject headings. Bruce's Six frames model (Bruce, Edwards & Lupton, 2015) through the relational variable proposes that teaching of ILS should be crafted in a way that encourages teachers to introduce unique perspectives on certain occurrences and helps students develop new perspectives on the world. (Bruce et al., 2006).

In Kenya, Kavulya (2003) and Kingori et al (2013) acknowledge that universities have a library user education topic as a component of the communication skills course unit which is imparted along with library reading, information, and writing skills whose overall objective is to enable users to utilize the library information resources effectively. Additionally, Odini (2000) notes that Kenyan educational institutions provide

a variety of ILS programs. These include using library manuals and guides, personalized instruction or reference services, library instruction courses, and library orientation. Furthermore, Ukachi's (2015) and Soto's (2014) studies have shown the unavailability of standard assessment techniques to ascertain the effectiveness of the ILS curriculum. Additionally, many learners engage in plagiarism, have inadequate critical thinking skills, have deficient information evaluation techniques, don't know information search strategies, do not understand intellectual property rights, relying heavily on Google as the main source of information Ukachi (2015) and Soto (2014). This is a clear indication of the absence of ILS competencies hence low utilization of ILS in accessing, evaluating, and of information materials in Kenya hence this study will help bridge this gap. This study therefore sought to: examine the ILS curricula in place to facilitate the delivery of ILS among medical undergraduate students at Moi University and the University of Nairobi, and to assess the methods used to enhance the delivery of ILS among medical undergraduate students at Moi University and University of Nairobi.

III. METHODOLOGY

This study adopted the pragmatist paradigm since it provided a pathway to choose inquiry methodologies that best addressed the study research questions. As such, the mixed method strategy selected, enabled the researcher to collect both qualitative and quantitative data. The consequence of integrating quantitative and qualitative results is the likelihood of realizing a wholesome scenario concerning the research topic (Truong, 2020). Furthermore, Creswell & Creswell (2018), avers that a research study that adopts mixed methods enable triangulation of quantitative and qualitative findings. This research used concurrent triangulation. Data collection of both quantitative and qualitative done simultaneously, ensuring that the deficiencies of qualitative data were optimally countered by the advantages of quantitative data. In the blending of the findings, the two types of data were given equal significance. Quantitative and qualitative data were analysed separately, and the conclusions were mixed. The concurrent triangulation technique guided the researcher to comprehensively examine the problem of the study by using the two types of data in interpreting the findings (Cohen..et al, 2017). This study employed a descriptive survey design so as to describe the status of ILS among undergraduate medical students at the two selected universities.

The target population was 685 students comprising 6th-year medicine, 5th-year dentistry, and 4th-year nursing students, and 182 lecturers. Undergraduate students in 4th year nursing, 5th-year dentistry, and 6th year medicine who were 397 were sampled using the table of determining sample sizes developed by Saunders, Lewis, and Thornhill (2012). The student sample size was determined by applying a 98 percent confidence level and a 2% margin of error. A sample consisting of 62 lecturers was chosen based on a 95 percent confidence level and a margin of error of 5%. The purposive sample approach was used to pick two University Librarians, two Medical Librarians, and six heads of departments (three from each of the two universities under investigation). Purposive sampling is suitable where a study purposely targets certain respondents believed to have relevant information appropriate for the research inquiry (Kombo and Tromp, 2006). Data was collected using interviews and questionnaires. The study espoused interviews to gather data from the University Librarians, Medical Librarians, and Heads of Departments while questionnaires were utilized to collect data from undergraduate medical students and lecturers. The study espoused both content and face validities. Content validity is an estimate of how well data acquired through a certain data collection tool represents a particular set of indicators or specific ideas. (Creswell, 2015).

Face validity implies that the questions meant to test an idea should appear to test the ideas on the surface of the schedule (Saunders et al., 2012). To ensure that the questionnaires and interview schedules are valid, the researcher sent out the tools for collecting data to ILS experts for recommendations, suggestions, and proposals on desired changes that needed to be made in terms of question suitability, questionnaire structure, and interview schedule (Saunders et al., 2012). The data was analyzed statistically and qualitatively to provide answers to the study questions. The study examined qualitative data, segmented it into significant logical units, coded the data into significant descriptions or group labels, and grouped the groups of data into themes that responded to the research objectives and questions (Creswell, 2015). Similarly, while analyzing statistical data, the researcher assigned code groups based on a pre-established coding scheme. The chosen coding method suited the study's research objectives and represented the reasoning derived from the data (Babbie, 2017). The codes were then transformed into numerical formats (Creswell, 2015). The ensuing data from these numerical representations enabled the study's description, explanation, summary, comparison, and understanding of data using percentages graphs, and charts. The participants were guaranteed their privacy, confidentially, and anonymity. The participants were also informed that it was within their right to withdraw from the study at any stage if they so wished without any authorization. Additionally, the researcher

complied with Moi University research ethical guidelines. Also, the study obtained a research permit from NACOSTI in Kenya.

IV. RESULTS AND DISCUSSION

This section examines the empirical outcomes of the study on the information literacy skills curricula and policies supporting the delivery of ILS to medical undergraduate students at the two universities. Both qualitative and quantitative data were analysed using themes and sub-themes drawn from the research objectives and questions.

Availability of ILS policy

The study sought to find out if the institutions under study had an ILS policy and curriculum. The participants were requested to indicate if there was an ILS policy and curriculum in their institution of learning.

Figure 1: Students response on availability of ILS Policy (N=255)[1]

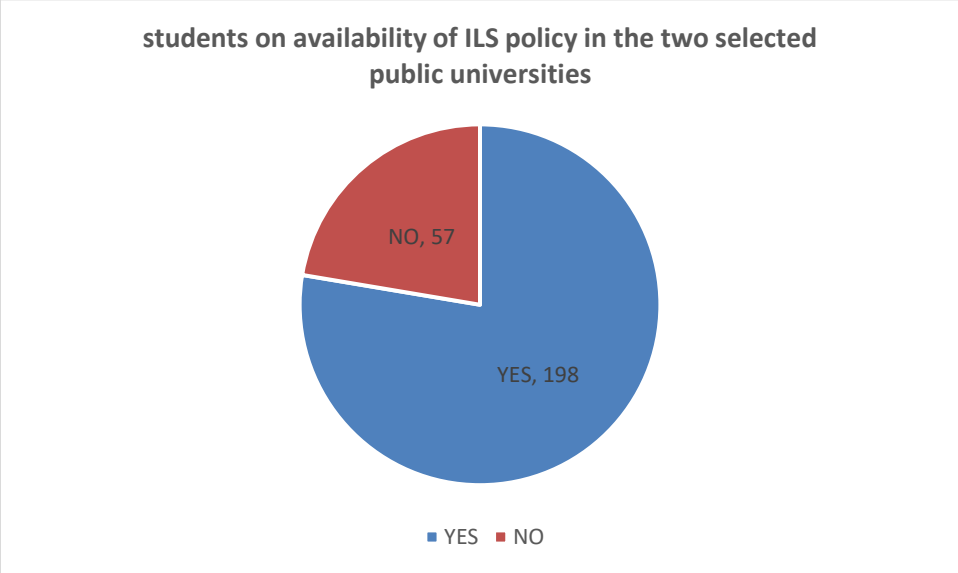

Figure 2: Lecturers' responses on the availability of ILS policy (N=62)

[1] **Source**: Field data, 2021 (*figures 1 & 2*)

The findings revealed that the two universities had ILS policies. This is according to 198(77.64%) of the students as illustrated in Figure 1 and 56 (90.32%) of the lecturers as shown in Figure 2. Similarly, the respondents interviewed unanimously agreed that information literacy skills policy and procedures were available.

In essence, one head of the department (*HD01*) commented:

> *"…. yes, the ILS policy and curriculum is available which guides students on how to search and use information independently……. The procedure also stipulates on how the teaching of ILS ought to be carried out…however, the ILS policy has no timeframe on when and how it should be updated to cater for new developments in the information landscape…"*

This finding is contrary to Mundave's (2016) study on information literacy learning among psychology students in Kenya where he found that there was the absence of an information literacy policy for information literacy skills learning and training.

Similarly, Baro's (2013) study on information literacy programs in Nigerian universities revealed that the absence of an information literacy skills policy was a major challenge to the development of information literacy skills in universities in Nigeria.

Also, Lwehabura and Stilwell's (2008) study on the challenges and opportunities of IL programs in Tanzanian universities revealed that the absence of an Information Literacy skills policy impeded Information Literacy skills instruction and learning.

ILS skills covered by policy

The lecturer and student respondents were asked to state the areas covered by ILS policies. The responses from both students and lecturers are presented in Tables 1 and 2. Students were requested to state the various skill sets that the ILS policy covered. Table 1[2] (on the following page) summarizes the students' responses.

The respondents were asked to state the areas covered by ILS policies. The findings revealed that the majority of the students' respondents stated that knowledge and information skills; problem-solving and critical thinking; communication skills, information technology skills; social responsibility skills; and referencing and legal issues were the areas covered by the ILS policies in 200 (78.43%), 198(77.65%), 225(88.23%), 215(84.31%), 199(78.04%) and 197(77.25%) in that order as indicated in Table 1.

Similarly, the majority of the lecturer lecturers 58 (93.76%), 55 (89.06%), 58 (93.76%), 55 (89.06%), 57 (90.63%) and 55 (89.06%) agreed that knowledge and information skills; problem-solving and critical thinking; communication skills; information technology skills; social responsibility skills; and referencing and legal issues are areas covered by the ILS policy in that order as indicated in Table 2 (on the following page).

The responses from interviews were that ILS policies covered areas of knowledge and information skills, communication skills, research skills, problem-solving skills, information technology skills, and anti-plagiarism skills. The findings suggest that the medical undergraduate students are appropriately trained with ILS skills and hence equipped with research skills, good communication techniques, and critical skills which will help them to become independent lifelong learners. These skills will enable people to apply their knowledge from the familiar environment to the unfamiliar that is, apply new and more effective medicines being discovered, new medical devices and procedures being invented, and new diseases that are causing havoc to humanity such as COVID-19, Ebola, Zika virus and HIV among many others.

The findings are in line with Mudave's (2016) study on information literacy learning experiences of fourth-year psychology students in Kenyan universities, which revealed that ILS policies are meant to promote information literacy skills as a key competency for lifelong learning among students and that they are fundamental to ILS teaching, learning and research focus of the African Universities community. Furthermore, the study found that ILS policies enable and empower students to be critical and independent users of information by embedding information literacy skills into their university experience. Similarly, the findings concur with Yassina (2020), study which revealed that instructing students to successfully access, critically assess, and utilize information, and put into use skills learned to solve current and foreseeable challenges is a crucial goal of an ILS curriculum.

[2] **Source**: Field data, 2021 (*tables 1-4*)

Table 1: Students' response on the ILS skills covered by the ILS policy (N=255)

Statement	SD		D		N		A		SA		Total		Mean	sd
	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Knowledge and information skills	13	5.09	24	9.42	18	7.05	132	51.76	68	26.67	255	100	3.9	3.5
Problem-solving and critical thinking skills	15	5.88	29	11.37	13	5.1	148	58.04	50	19.61	255	100	3.7	3.4
Communication skills	8	3.14	12	4.7	10	3.92	124	48.62	101	39.61	255	100	4.2	3.8
Information technology skills	11	4.31	13	5.09	16	6.27	166	65.49	49	19.21	2.55	100	3.9	3.5
Social Responsibility skills	14	5.49	23	9.01	19	7.45	169	66.27	30	11.76	255	100	3.7	3.3
Referencing and legal issues skills	9	3.52	17	6.67	32	12.55	142	55.68	55	21.56	2.55	100	3.9	3.4

Table 2: Lecturer's response on information literacy skills covered by the ILS policy (N=62)

ILS	SD		D		N		A		SA		Total		Mean	sd
	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Knowledge and information skills	2	3.13	1	1.56	1	1.56	53	85.94	5	8.06	62	100	3.94	3.46
Problem-solving and critical thinking skills	3	4.69	2	3.13	1	2.34	50	81.25	5	8.06	62	99	3.82	3.39
Communication skills	1	1.56	1	1.56	2	3.13	49	79.69	9	14.06	62	100	4.03	3.55
Information technology skills	2	3.13	2	3.13	3	4.69	51	82.81	4	6.25	62	100	3.86	3.4
Social Responsibility skills	3	4.69	2	3.13	l	1.56	47	75	10	15.63	62	100	3.94	3.5
Referencing and legal issues skills	2	3.13	3	4.69	2	3.13	50	81.25	5	8.06	62	100	3.9	3.43

Adequacy of the ILS policy and curriculum in place

The interviewed respondents rated the adequacy of the ILS policy and curriculum in addressing ILS training and learning among medical students. Two university librarians, six heads of departments, and two heads of medical librarians responded. Out of the total 10 respondents interviewed, 2 (20%) stated that the ILS policy in place was adequate in addressing the training and learning of ILS among students. While 8 (80%) of the interviewed respondents stated that the ILS policy and curriculum in place was inadequate in addressing ILS training and learning needs among students because it does not state who is responsible for ILS training, timeframes for reviews and updates are not indicated, assessments and reviews have never been carried out and the policy updated to reflect changes in the information environment. Furthermore, ILS training is never timetabled and is carried out at the convenience of the librarian and the lecturers and the requisite facilities for ILS instruction are not available/provided

The findings suggest that policy reviews have never been conducted, updates have never been affected, the policy did not advocate for the allocation of adequate time for ILS training and learning, the ILS training is conducted at the convenience of the librarians and lecturers because it is not timetabled. This is an indication that ILS policy has not been implemented as envisioned and it does not address the changes taking place in the medical field. As a consequence, students have not been adequately trained on ILS. Bazrafkan et al (2018) emphasize that medical faculty students need extensive and varied sources of information to perform their job roles and also cope with the complexities of different medical specializations. To satisfy this need medical undergraduate students need information literacy skills to help utilize the information resources available by enhancing their information search, retrieval, and evaluation skills.

Similarly, the findings concur with Kavulya (2003) and Yassina (2020), study which demonstrated that the limited time allocated to the lecture, demonstration, and library tour is inadequate to impart useful skills to new university students. consequently, the timing of library orientation programs in the first and second week of students' life in the university is poor since at this time students have little motivation to participate and may not be in a position to appreciate the centrality of the library in academic life.

Methods of ILS curriculum delivery

Additionally, the study sought to establish the methods utilized in delivering ILS curriculum to medical undergraduate students. The findings are shown in Tables 3 and 4 (*on the following page*) for students and lecturers respectively.

The findings revealed that computers, face-to-face teaching, online materials, handouts, library orientation, WhatsApp group engagements, peer training, pre-recorded audio-video clips, and weekly librarian-student engagements, were the most common methods used for ILS delivery to medical undergraduate students, as noted by 224(87.84%), 234(91.76%), 241(94.50%), 190(74.50%) and 241(94.50%) of the students in that order[3]. Similarly, 58 (93.55%), 58(93.55%), 42 (67.74), 46 (74.20%), 49 (79.03%) and 55 (88.71%) of the lecturers stated that handouts, library orientation, WhatsApp group engagements, peer training, weekly librarian-student engagements/discourse and pre-recorded audio-visual video clips were used to impart ILS to undergraduate medical students respectively[4].

The verbatim findings also gave similar responses which are summarized in the words of two respondents, that is a university Librarian (UL 02) and one head of the department (HD05).

A university librarian (UL 02) from one of the universities had this to say:

> *"… we utilize peer training through knowledge ambassadors among the students…. I also have a program known as librarian-student weekly engagement where we discuss issues on library information material access and use, and find out the challenges that they face in retrieving and using the information …"*

One head of department (HD05) reiterated:

> *"…professionals involved in ILS teaching employ several tools to teach these important skills, the methods include among other methods, online classes, pre-recorded audio-visual videos prepared by the library personnel, formation of social media groups where the department engages positively with students on issues concerning access to information materials, originality in clinical writings, usage of information. We also have face-to-face engagements, giving out handouts on information usage, search …"*

[3] See table 3 on the following page

[4] See table 4 on the following page

Table 3: Students' response to methods of ILS delivery (N=255)

Methods of ILS delivery	SD		D		N		A		SA		Total		Mean	sd
	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Computers	12	4.7	10	3.92	9	3.5	172	67	52	20.39	255	100	3.95	3.53
Face to face teaching	3	1.2	13	5.09	5	2	186	73	48	18.82	255	100	4.03	3.57
Online materials	4	1.6	8	3.13	2	0.8	192	75	49	19.21	255	100	4.07	3.6
Handouts	15	5.9	10	3.92	17	6.7	175	69	38	14.9	255	100	3.83	3.42
Library orientation	19	7.5	22	8.67	24	9.4	156	61	34	13.33	255	100	3.64	3.28
WhatsApp group engagements	31	12	21	8.23	9	3.5	142	56	52	20.39	255	100	3.64	3.34
Peer training	33	13	15	5.88	10	3.9	124	49	73	28.62	255	100	3.74	3.45
Pre-recorded audio/video clips	12	4.7	10	3.92	18	7.1	146	57	69	27.05	255	100	3.98	3.58
Weekly librarian-student engagements	8	3.1	7	2.74	11	4.3	169	66	60	23.52	255	100	4.04	3.60

Table 4: Lecturers' response on methods of ILS delivery (N=62)

Statement	SD		D		N		A		SA		Total		Mean	sd
	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Computers	1	1.61	l	1.61	2	3.23	51	82.26	7	11.29	62	100	3.99	3.51
Face to face teaching	1	1.61	2	3.23	4	6.45	44	70.97	11	17.74	62	100	3.98	3.52
Online materials	4	6.45	3	4.84	5	8.06	39	62.90	11	17.74	62	100	3.80	3.41
Handouts	2	3.23	1	1.61	l	1.61	48	77.42	10	16.13	62	100	3.97	3.52
Library orientation	1	1.61	l	1.61	2	3.23	53	85.48	5	8.06	62	100	3.95	3.46
WhatsApp group engagements	6	9.68	8	12.9	6	9.68	35	56.45	7	11.29	62	100	3.5	3.17
Peer training	9	14.52	5	8.06	3	4.84	31	50	14	22.58	62	100	3.6	3.33
Pre-recorded audio/video clips	2	3.23	6	9.68	5	8.06	40	64.52	9	14.52	62	100	3.76	3.35
Weekly librarian-student engagements	l	1.61	1	1.61	5	8.06	35	56.45	20	32.26	62	100	4.15	3.69

In the same breath, interview responses revealed that computers, the formation of social media groups where the department engages with students on issues concerning access to information materials, peer training, one one-on-one teaching, and online materials offered to students are some of the methods used to deliver ILS to medical undergraduate students. Additionally, interview responses found that most of the institutions offer ILS classes via online platforms, library websites, and library engagement forums. The findings also seem to suggest that computers facilitated the utilization of (Information Technology) IT solutions like Google Meet and ZOOM to train information literacy skills in undergraduate medical students. This indicates the mode of ILS instruction is technology-orientated and that there are variations in channels used to train students contributing high uptake of ILS among students. The relational frame of Bruce's Six Frames Model supports these findings by stating that learning occurs when variations in ways of understanding are recognized. That is, ILS is learned when different means and ways are recognized and used to deliver the ILS content. The model states that "bringing about learning through widening experience and thus revealing variation, is the underlying principle" of ILS learning and teaching (Bruce, 2006).

The findings agree with Bruce, (2009) study on information literacy training in Africa, which found that ILS instruction in higher education institutions has taken a variety of forms namely online tutorials, stand-alone courses or classes, workbooks, course-related instruction, or course-integrated instruction. In support of these findings, Caffrey (2022) study on the most common methods adopted in ILS training found that the common methods of delivering ILS are one-on-one sessions, library orientation, and formal or classroom instruction. Similarly, in Baro and Zuokemefa's (2011) study on Information literacy programs in Nigeria: a survey of 36 university libraries revealed that the common methods of ILS delivery were face-to-face in the library training room and face-to-face in a venue external to the library. However, their study found that there was limited online training because the libraries require adequate IT personnel who are skilled in using technology, absence of facilities such as modern computers with internet connectivity in some university libraries, and unreliable power supply.

Techniques for assessing the effectiveness of the ILS curriculum and policy

The study sought to learn about the assessment techniques used to determine the success of ILS curriculum instruction. Lecturers were asked to describe the assessment procedures they used to evaluate the efficiency of ILS curriculum instruction. The replies were similar, and they are summarized in Table 5[5] below.

Table 5: Techniques for assessing the effectiveness of the ILS curriculum

Respondents	***Responses from the questionnaire***
LT11	*Practical research writing; Creative clinical presentations;*
LT23	*ILS feedback forms*
LT36	*Focus groups, interviews*
LT41	*Knowledge tests*
LT55	*Informal assessment techniques*
LT57	*On the spot assessment*
LT59	*Pre-Assessment Using CATs,*
LT60	*Examination for those trained in Communication skills classes*
LT62	*Continuous assessment Tests*

[5] **Source**: Field data (2021) [**Key**: LT = Lecturer]

University librarians, heads of departments, and heads of medical librarians were asked to state the various techniques used to assess the effectiveness of the ILS curriculum delivery. The findings revealed that several methods were used such as focus groups, concept maps, CATs, information assessment techniques, written examination in the Communication Skills Unit, on-the-spot assessment, clinical presentations, knowledge tests through creative clinical and research papers, and ILS feedback forms. The verbatim findings affirmed that several methods are employed to assess the effectiveness of the ILS curriculum. Heads of departments, medical librarians, and university librarians agreed that numerous methods were employed such as focus groups, on the spot assessment concept maps, CATs, information assessment techniques, interviewing, knowledge tests through creative clinical and research papers, and ILS feedback forms.

One University Librarian (UL01) said:

> *"… Librarians use concept maps more frequently because they provide unique opportunities to assist students in integrating new concepts….. …they are appropriate as a pre-test and post-test for students and therefore work best in assessing course-integrated information literacy instruction and standalone information literacy courses like communication skills …"*

Addiotnally, one head medical librarian (ML02) when interviewed said:

> *"… Our institution uses the focus groups, concept maps and CATs to assess ILS of our medical students …."*

In addition, the findings revealed that Librarians more often use concept maps. Because concept maps offer unique opportunities to help students integrate new concepts into their existing understanding of information seeking, evaluation and use, and to allow the instructors to gauge the understanding level. The findings suggest that assessment on ILS learning is conducted through summative assessment which seeks to gauge what students have learned at the conclusion of a learning session by juxtaposing it to some norm or guideline. These findings indicate that this form of assessment might be another reason why students have underdeveloped ILS, because once the assessment is done at end of a training exercise, there isn't time or another session to address students' weaknesses found by assessments. Also, the method puts students under stress which affect ILS learning among the students. the suggestions are supported by the assessment techniques of the relational frame of the six frames model, which argue that assessment is designed to identify which ways of seeing IL, or other relevant phenomenon, students have learned to discern.

In support of these findings, Al-Qallaf (2021) states that the effectiveness of ILS training is an examination and assessment testing. Furthermore, Bundy (2014) posits that the effectiveness and efficiency of information literacy skills, should be assessed on sound elements which include generic skills – that is problem-solving, collaboration, teamwork, communication, and critical thinking; information skills- that is information seeking, information use, information technology fluency; and values and beliefs- that is using information wisely and ethically, social responsibility and community participation. This will ensure that the students have the necessary knowledge and skills for long-life learning.

V. CONCLUSION

The findings suggest that the institutions have ILS curriculum and policies that are championed by university librarians and cover ILS content that includes information skills, problem-solving and critical thinking, communication skills, information technology skills, social responsibility skills, referencing, and legal issues in information. However, the study revealed that the ILS policy and curriculum have never been reviewed or updated; implementation of the ILS policy and curriculum has not been done as required because no responsibility was attached; the policy did not provide for the amount of training time required and requisite facilities for information literacy skills instruction.

Additionally, the study found that there was limited collaboration and teamwork between lecturers and librarians in the delivery of ILS in the sense that some faculty members were unwilling to collaborate with librarians because they do not view librarians as partners.

VI. RECOMMENDATION

The findings revealed that even though ILS policy was available it was not being implemented fully because of the absence of attached responsibility and unavailability of an examinable information literacy skills unit or units that fully covered all the ILS content. Given these findings, the researcher recommends that it should be made a policy and procedure issue that university librarians and heads of departments be charged with

coordinating ILS collaboration activities, right from curriculum design to its delivery to students, and that ILS should classed into 4 credit scores units whereby one unit should be taught in each academic year

Further, the study found that there was an absence of standardized information literacy skills programs provided in the universities under study. This demonstrated a lack of harmonized ILS programs. Therefore, the study strongly recommends the establishment of four ILS credit-scored units that should be separated from the communication and writing skills course unit and they should take the same contact hours as other units at the universities. In addition, these units should have a practical orientation, with 70% practical and 30% theory.

REFERENCES

Adebayo, O. A., Ahmed, Y. O., & Adeniran, R. T. (2018). The Role of ICT in Provision of Library Services: A Panacea for Sustainable Development in Nigeria. *Library Philosophy & Practice*. Retrieved from http://digitalcommons.unl.edu/libphilprac/1951

Adela, F. (2020). Reopening Ethiopian Higher Education Institutions Library in the Context of COVID-19. *International Journal of Information Library and Society*, *9*(2), 38–43.

Adomi, E. E., & Oyovwe-Tinuoye, G. O. (2022). COVID-19 informati Adekunle, A. P., Olla, G. O., Olajide, A., Osuji, C., & Adedoyin, A. (2019). Attitude of undergraduate students to information literacy: Bowen University experience. *Journal of Balkan Libraries Union*, *6*(1), 1-11.

Agyen-Gyasi, K. (2008). User education at the Kwame Nkrumah University of Science and Technology (KNUST) Library: prospects and challenges. *Library philosophy and practice*, *4*(2), 25-40.

Al-Qallaf, C.L. and Aljiran, M.A. (2021), "The teaching and learning of information literacy skills among high school students: Are we there yet?", *International Information and Library Review.* American Library Association. (2020). ALA Annual Conference Program Book-Washington, DC, 2019.

Amunga, H. A. (2011). Information literacy in the 21st century universities: The Kenyan experience.

Ani, O. E., Esin, J. E., & Edem, N. (2005). Adoption of information and communication technology (ICT) in academic libraries: A strategy for library networking in Nigeria. *The electronic library*.

Ankamah, S., Gyesi, K. and Anaman, A.A. (2021), "The evaluation of information literacy among medical students at the College of Health Sciences, University of Ghana", *Library Philosophy and Practice*, Vol. 2021.

Anyaoku, E. N., Ezeani, C. N., & Osuigwe, N. E. (2015). Information literacy practices of librarians in universities in Southeast Nigeria. *International Journal of Library and Information Science*, *7*(5), 96-102.

Arp, L., & Woodard, B. S. (2003). Information Literacy and Instruction-Information Literacy in School Libraries-It Takes a community. *Reference and User Services Quarterly*, *42*(3), 215-223.

Ashipala, D.O. and Livingi, R.M. (2021), "Undergraduate nursing students' challenges when writing research proposals at the University of Namibia", *Africa Journal of Nursing and Midwifery*, Vol. 23 No. 1.

Association of College and Research Libraries (2020), *Information Literacy Competency Standard for Higher Education* , ACRL, Chicago, IL, available at: www.ala.org/acrl/ilcomstan.html (accessed 24 April 2020).

Babbie, E., Halley, F., & Zaino, J. (2007). *Adventures in social research: data analysis using SPSS 14.0 and 15.0 for Windows*. Pine Forge Press.

Baer, A. (2021), "Academic librarians' development as teachers: A survey on changes in pedagogical roles, approaches, and perspectives", *Journal of Information Literacy*, Vol. 15 No. 1, pp. 26-53

Baro, E. E. (2011). A survey of information literacy education in library schools in Africa. *Library Review*, *60*(3), 202-217.

Baro, E. E., & Zuokemefa, T. (2011). Information literacy programmes in Nigeria: a survey of 36 university libraries. *New Library World*, *112*(11/12), 549-565.

Baro, E. E., Seimode, F. D., & Godfrey, V. Z. (2013). Information literacy programmes in university libraries: A case study. *Libri*, *63*(4), 282-294.

Batool, S.H., Rehman, A. and Sulehri, I. (2021), "The current situation of information literacy education and curriculum design in Pakistan: a discovery using Delphi method", *Library Hi Tech.*

Bedford, D. (2021), "Evaluating confidence in information literacy: a red/amber/green approach", *Journal of Information Literacy*, Vol. 15 No. 1, pp. 96-104.

Benallack, C. and Rundels, J.J. (2021), "Mapping the framework to credit-bearing information literacy courses", *Journal of Academic Librarianship*, Vol. 47 No. 6.

Bombaro, C. (2014), "Overcoming the barriers to information literacy programs: CALM Lab for English majors at Dickinson College", *Reference Services Review*, Vol. 42 No. 2, pp. 246-262. https://doi.org/10.1108/RSR-10-2013-0050

Bruce, C., Edwards, S., & Lupton, M. (2006). Six Frames for Information literacy Education: a conceptual framework for interpreting the relationships between theory and practice. *Innovation in Teaching and Learning in Information and Computer Sciences*, *5*(1), 1-18.

Buzzo, D. (2018). University of West of England Bristol, UK daniel. buzzo@ uwe. ac. uk.

Caffrey, C., Lee, H., Withorn, T., Clarke, M., Castañeda, A., Macomber, K., Jackson, K.M., Eslami, J., Haas, A., Philo, T., Galoozis, E., Vermeer, W., Andora, A. and Kohn, K.P. (2022), "Library instruction and information literacy 2021", *Reference Services Review*, Vol. 50 No. 3/4, pp. 271-355. https://doi.org/10.1108/RSR-09-2022-0035

Caffrey, C., Lee, H., Withorn, T., Clarke, M., Castañeda, A., Macomber, K., Jackson, K.M., Eslami, J., Haas, A., Philo, T., Galoozis, E., Vermeer, W., Andora, A. and Kohn, K.P. (2022), "Library instruction and information literacy 2021", *Reference Services Review*, Vol. 50 No. 3/4, pp. 271-355. https://doi.org/10.1108/RSR-09-2022-0035

Catalano, A. J. (2010). Using ACRL standards to assess the information literacy of graduate students in an education program.

Chetty, K., Qigui, L., Gcora, N., Josie, J., Wenwei, L . and Fang, C. (2018), "*Bridging the digital divide: measuring digital literacy*", Economics, Vol. 12 No. 1.

Cohen, L., Manion, L., & Morrison, K. (2017). Action research. In *Research methods in education* (pp. 440-456). Routledge.

Creswell, J.W. (2015), "*Revisiting mixed methods and advancing scientific practices*" in Hesse-Biber, S. and Johnson, R.W. (Eds), The Oxford Handbook of Multimethod and Mixed Methods Research Inquiry, Oxford University Press, Oxford, pp. 57-71.

Creswell, J.W. and Creswell, D.J. (2018), Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, Sage, Washington, DC.

Dadzie, P. S. (2007). Information literacy: assessing the readiness of Ghanaian universities. *Information development*, *23*(4), 266-277.

Dahlqvist, C. (2021), "Information-seeking behaviours of teacher students: a systematic review of qualitative methods literature", *Education for Information*, No. 37, pp. 287-313

Dubicki, E. (2013). Faculty perceptions of students' information literacy skills competencies. *Journal of Information Literacy*, *7*(2).

Dulle, F. W., Lwehabura, M. J. F., Matovelo, D. S., & Mulimila, R. T. (2004). Creating a core journal collection for agricultural research in Tanzania: citation analysis and user opinion

Emerson, L., Kilpin, K. and Lamond, H. (2021), *Literacy across the Divide: Information Literacy as the Key to Student Transition*, Nzcer Press, Wellington.

Gatero, G. (2011). Utilization of ICTs for accessing health information by medical professionals in Kenya: A case study of Kenyatta National Hospital. *Journal of Health Informatics in Developing Countries*, *5*(1).

Kennedy, C. H. (2005). *Single-case designs for educational research* (Vol. 1). Boston: Pearson/A & B.

Kingori, G. M., Chege, A., & Kemoni, H. N. (2014). Re-engineering information literacy programmes of Nairobi-based public and private universities in Kenya. In *Concepts and Advances in Information Knowledge Management* (pp. 143-165). Chandos Publishing.

Kingori, J. N. (2015). *Influence of hidden costs in education on students' participation in public secondary schools in Kikuyu sub county, Kenya* (Doctoral dissertation, University of Nairobi).

Klassen, A. C., Creswell, J., Plano Clark, V. L., Smith, K. C., & Meissner, H. I. (2012). Best practices in mixed methods for quality-of-life research. *Quality of life Research*, *21*, 377-380.

Klomsri, T., & Tedre, M. (2016). Poor information literacy skills and practices as barriers to academic performance: A mixed methods study of the University of Dar es Salaam. *Reference and User Services Quarterly*, *55*(4), 293-305.

Kombo, D. K., & Tromp, D. L. (2006). Proposal and thesis writing: An introduction. *Nairobi: Paulines Publications Africa*, *5*(1), 814-30.

LaBonte, K., & Hoffmann, D. (2012). Meeting information literacy outcomes: Partnering with faculty to create effective information literacy assessment. *Journal of information Literacy*, *6*(2), 70.

Lawal, V., Stilwell, C., Kuhn, R., & Underwood, P. G. (2013). Perspectives on legal education and the role of information literacy in improving qualitative legal practice. In *Developing People's Information Capabilities: Fostering Information Literacy in Educational, Workplace and Community Contexts* (Vol. 8, pp. 151-166). Emerald Group Publishing Limited. Leeds, pp. 151-166. https://doi.org/10.1108/S1876-0562(2013)0000008014

Lumande, E., Ojedokun, A., & Fidzani, B. (2006). Information literacy skills course delivery through WebCT: the University of Botswana Library experience. *International Journal of Education and Development using ICT*, *2*(1), 66-78.

Mokhtar, I. A., Majid, S., & Foo, S. (2008). Teaching information literacy through learning styles: The application of Gardner's multiple intelligences. *Journal of Librarianship and Information Science*, *40*(2), 93-109.

Momanyi, E., Toroitich, P., & Onderi, P. (2018). Information literacy programming, students' skills and utilization of e-resources at Maseno University, Kenya.

Muema Kavulya, J. (2003). Challenges facing information literacy efforts in Kenya: A case study of selected university libraries in Kenya. *Library Management*, *24*(4/5), 216-222.

Mugambi, M. K. (2013). *Effects of e-government strategy on service delivery in the government ministries in Kenya* (Doctoral dissertation, University of Nairobi).

Nand, R. and Sharma, B. (2019), Meta-Heuristic Approaches to Tackle Skill Based Group Allocation of Students in Project Based Learning Courses, IEEE Congress on Evolutionary Computation (CEC), pp. 1782-1789.

Nichols, T.P. and Stornaiuolo, A. (2019), "*Assembling 'digital literacies': contingent pasts, possible futures*", Media and Communication, Vol. 7 No. 2, p. 14.

Nkebukwa, A. K. (2004). Access to Knowledge: Challenges for Public University Information Professionals. *Training and Management of Information Services in the New Milenium: 16th to 19th October, 2002 Bagamoyo Tanzania: Proceedings*, 54.

Njoroge, J. M. (2020). CUE guidelines and their implications.

Odini, S. (2014). Access to and use of agricultural information by small scale women farmers in support of efforts to attain food security in Vihiga County, Kenya. *Journal of emerging trends in economics and management sciences*, *5*(2), 80-86.

Ramabina, M. T., & Ndou, A. S. (2023). Information literacy content for first year law students at a rural-based university in South Africa. *South African Journal of Libraries and Information Science*, *89*(1), 1-9.

Shibambu, A. and Mojapelo, S.M. (2024), "The status of digital and information literacies in South Africa from 2016 to 2022: a literature review", *Global Knowledge, Memory and Communication*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/GKMC-04-2023-0142

Soto, J. G., Anand, S., & McGee, E. (2004). Plagiarism avoidance: An empirical study examining teaching strategies. *Journal of College Science Teaching*, *33*(7), 42-48.

Sutton, J., Spiro, E. S., Johnson, B., Fitzhugh, S., Gibson, B., & Butts, C. T. (2014). Warning tweets: Serial transmission of messages during the warning phase of a disaster event. *Information, Communication & Society*, *17*(6), 765-787.

Taylor, J. R. (2006). *Scattering theory: the quantum theory of nonrelativistic collisions*. Courier Corporation.

Thongprayoon, C., Harrison, A. M., O'Horo, J. C., Berrios, R. A. S., Pickering, B. W., & Herasevich, V. (2016). The effect of an electronic checklist on critical care provider workload, errors, and performance. *Journal of intensive care medicine*, *31*(3), 205-212.

Truong, D., Xiaoming Liu, R. and Yu, J. J. (2020), "Mixed methods research in tourism and hospitality journals", *International Journal of Contemporary Hospitality Management*, Vol. 32 No. 4, pp. 1563-1579. https://doi.org/10.1108/IJCHM-03-2019-0286

Ukachi, N.B. (2015), "Exploration of information literacy skills status and impacts on the quality of life of artisans in Lagos, Nigeria", *New Library World*, Vol. 116 No. 9/10, pp. 578-587. https://doi.org/10.1108/NLW-01-2015-0006

Withorn, T., Messer Kimmitt, J., Caffrey, C., Andora, A., Springfield, C., Ospina, D., Clarke, M., Martinez, G., Castañeda, A., Haas, A. and Vermeer, W. (2020), "Library instruction and information literacy 2019", *Reference Services Review*, Vol. 48 No. 4, pp. 601-682. https://doi.org/10.1108/RSR-08-2020-0057

Yassina, A.T. (2020), "*Measuring information awareness of an industrial project for sustainable development using fuzzy logic*", International Journal of Innovation, Creativity and Change, *Vol. 12 No. 1, pp. 262–272.*