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COGNISANCE, ACCESS, AND UTILIZATION OF ELECTRONIC SCHOLARLY RESOURCES IN KNUSTSpace: THE CASE OF STAFF AND STUDENTS AT KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

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Bonsu, Frank Mensah; Essel, Harry Barton; Tachie-Menson, Akosua; and Hasan, Anna, "COGNISANCE, ACCESS, AND UTILIZATION OF ELECTRONIC SCHOLARLY RESOURCES IN KNUSTSpace: THE CASE OF STAFF AND STUDENTS AT KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY" (2020). *Library Philosophy and Practice (e-journal)*. 3938. <https://digitalcommons.unl.edu/libphilprac/3938>

**COGNISANCE, ACCESS, AND UTILISATION OF ELECTRONIC SCHOLARLY RESOURCES IN
KNUSTSpace: THE CASE OF STAFF AND STUDENTS AT KWAME NKRUMAH UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

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ABSTRACT

The Institutional Repository (KNUSTSpace) of the Kwame Nkrumah University of Science and Technology (KNUST) plays an essential role in meeting the information needs of scholars by providing free, instant, and endless online access to the full content of scholarly resources. The study investigated users' cognisance, access and usage effectiveness of electronic academic resources in KNUSTSpace to determine how it has satisfied the information needs of users. Thirty-five lecturers and 113 students responded to the survey. The study discovered that the majority of users are aware of the existence of KNUSTSpace; the results show a growing interest in the usage of electronic scholarly resources among staff and students at KNUST. The respondents identified KNUSTSpace as a useful tool in preserving, accessing and disseminating electronic scholarly resources. The study also identified some significant challenges concerning users' access and practical usage of academic resources in KNUSTSpace.

Keywords: Institutional Repository, KNUSTSpace, Electronic Resource, Scholarly Resources.

INTRODUCTION

The demand of Information and Communications Technology (ICT) has opened doors and platforms for scholars to work successfully through various ICT infrastructures, with access to open educational resources and services (Essel, 2010; Essel & Adjei, 2017; Appiah, Essel & Amankwa 2020). Open Access Institutional Repositories (OA-IRs) are the fastest developing academic phenomena today and mainly focus on free, instant and endless online access to the full content of electronic scholarly outputs of an institution (Verma & Shukla, 2014). KNUST has adopted an open access institutional repository, called the

¹ | Cognisance, Access and Usage of scholarly Resources in KNUSTSpace

KNUSTSpace, which has been accessible online since July 2009 (Lampthey & Corletey, 2011). The KNUSTSpace works on Dspace open-source software designed and developed by Hewlett Packard Laboratories (HP Labs) and Massachusetts Institute of Technology (MIT) (Essel, 2010; Essel & Osei-Poku, 2011). The KNUSTSpace holds scholarly resources such as Electronic Theses and Dissertations (ETDs), Scholarly Articles, Conference Proceedings, and Speeches. The KNUSTSpace has transformed the way scholars conduct and disseminate their research results, and it has also become an essential source for research works which every researcher depends on to help guide, store and distribute their research works (Essel, 2010). Since the inception of the KNUSTSpace, there has not been any evaluation of the cognisance, access and the utilisation of KNUSTSpace and how it serves the information needs of staff and students. Voorbij and Ongerling (2006) and Park (2007) emphasized that only users can disclose the reasons, views, gains, and problems experienced with online repositories; and these reasons necessitated the evaluation of KNUSTSpace. The study, therefore, evaluates KNUSTSpace users' cognisance, level of access and usage effectiveness in meeting their information needs. The results of this study can be beneficial to the effective and efficient running of KNUSTSpace services, as well as provide empirical evidence for IR managers, research community and also broaden readers' knowledge of the cognisance and usage effectiveness of KNUSTSpace. The following research questions drove the study:

1. What is the state of awareness of academic staff and students on KNUSTspace and its resources?
2. How do academic staff and students' access and utilise the KNUSTSpace and its resources?
3. What are the determinants for the level of the user (academic staffs and students) effectiveness of KNUSTSpace?

ELECTRONIC SCHOLARLY RESOURCES

Scholarly communication has been influenced by the presence of web development, as new electronic academic resources have emerged as powerful communication media for university libraries (Chopra, 2008); this has offered faster and reliable information for scholars/researchers (Kumar & Sampath, 2008). According to Chiraa and Madhusudhan (2009), electronic scholarly resources and services have turned out to be the most popular vehicle for research and academic activities. In recent years, studies carried out on the use of electronic scholarly resources and the state of electronic information environments in

universities that provides support to academic research institutions (Rolinson, Meadows & Smith, 1995). This study looked at the level of awareness, access and usage of scholarly resources in IR, mainly, by stakeholders' concern with research, learning and teaching. A study conducted at Ohio State University (Rogers, 2001) and Akrofi - Christaller Institute of Theology, Missions and Culture, and the Ghana Technology University College (Budu, 2015) indicated that there was essential progress in the use and acceptance of electronic scholarly resources by higher education student and academic staff. With regards to the awareness level of electronic information environment, the research conducted in the following Universities, in a study steered at the Catalan Universities in Spain (Borrenco et al., 2007), Dhaka University Library (Islam, Alam & Sultana, 2011) and Iranian university libraries (Tajafari, 2014) all showed high awareness levels and usage of electronic scholarly resources among faculty members and researchers. With accessing or retrieving stored information from IRs, the gateway is an interface designed to link with electronic scholarly resources by browsing and searching keywords such as title, abstract and authors' names to locate files in the IRs. Electronic scholarly resources can be accessed geographical from any country, making them omnipresent (Rao, 2004; Dhingra & Mahajan, 2007). On the contrary, studies carried out at Dhaka University Library (Islam, Alam & Sultana, 2011) and Iranian university libraries (Tajafari, 2014) reported on scholars' access to electronic scholarly resources.

The use of electronic scholarly resources among scholars has been the subject of research by many libraries across the globe, which aimed at improving the services of IRs and scholars' research, teaching, and learning. In a study at Loughborough University, Brown, Lund and Walton (2007), discovered that the usage of electronic scholarly resources by faculty members and researchers had an increasingly significant role in research at the university by providing current information needs for research, learning, and teaching. At the University of Karachi, electronic scholarly resources are the best means of having current information for scholars' research and lecture preparation (Ansari & Zuberi, 2010). Bentil (2011) adds that researchers use electronic scholarly resources for communication, finding relevant materials, research and teaching purposes, official or personal use, and to get new information relating to academia.

With regards to the effectiveness of IRs, it focuses on the quality to which KNUSTSpace user interface/website can easily be used or manipulated by academic staff and users. Users' need is paramount to the relevance and quality of contents in the IR. Some studies conducted showed that users have problems when accessing and using electronic

scholarly resources from IRs. Results of Asemi and Riyahiniya (2007) reported that users encountered issues like slow internet speed connectivity; moreover, Nisha and Naushad (2013) also indicated slow downloading of files when using electronic scholarly resources. The literature shows the need to explore the situation concerning access, use, and effectiveness in KNUST. Therefore, an attempt to examine the awareness, access and usage effectiveness of electronic scholarly resources in KNUSTSpace is essential since it was the first open access institutional repository in Ghana.

METHODOLOGY

The study employed descriptive statistics for data analysis. A structured survey questionnaire with open and closed-ended questions administered to gather data for the research. Thirty-five lecturers conveniently sampled from the Faculty of Art, KNUST. Additionally, the study involved 113 postgraduate students selected from five departments under the Faculty of Art, KNUST using proportional stratified sampling technique (see Figure 1). All the participants sampled for the study are internal/resident postgraduate students.

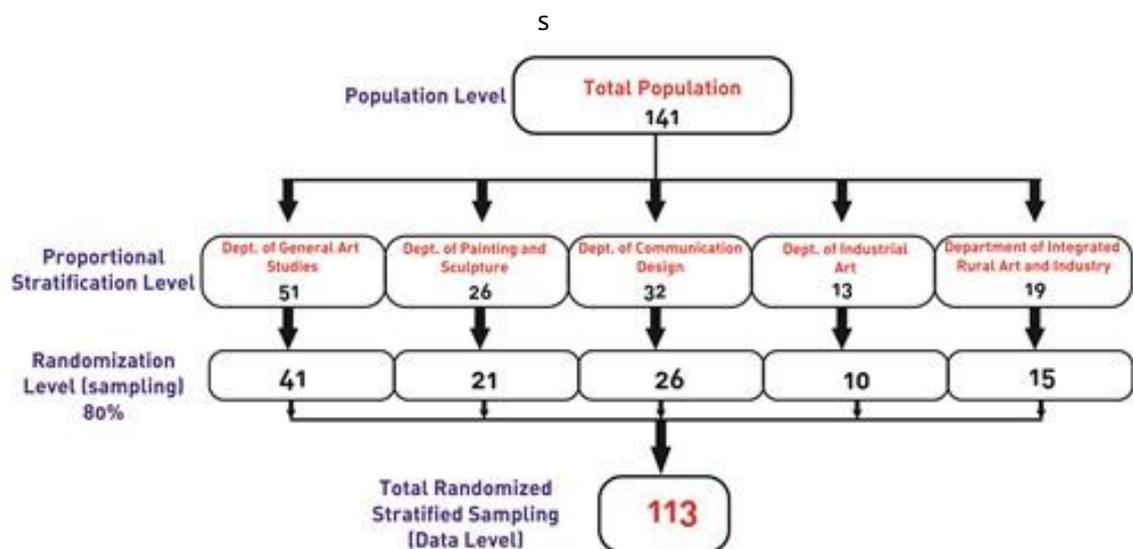


Fig. 1 Proportional stratification of Postgraduate Students. **Source:** Researchers' Construct

The study employed an online survey system (eQuestionnaire) to obtain data from postgraduate students. Online survey systems ease the burden associated with questionnaire administration and also can facilitate descriptive analytics (Essel, Nunu, Tachie-Menson & Amankwa, 2017). The eQuestionnaire had four sections:

sociodemographic data; awareness; access to IR resources; and utilization of IR resources.

Table 1 shows the return rate of the administered eQuestionnaire to postgraduate students and lecturers in the five departments of the Faculty of Art.

Table 1

The return rate of eQuestionnaire distributed to students and lecturers from the five departments.

Departments	Students (%)		Lecturers (%)	
Educational Innovation in Science and Technology	41	39.8	7	21.9
Painting and Sculpture	20	19.4	6	18.8
Communication Design	18	17.5	7	21.9
Industrial Art	9	8.7	6	18.8
Integrated Rural Art and Industry	15	14.6	6	18.8
Total	103	100	32	100

From table 1, the Department of Educational Innovations in Science and Technology had the highest return rate (39.8%) while the Department of Industrial Art recorded the least return rate (8.7%) of the eQuestionnaire by students. With lecturers, the study recorded maximum return rate (21.9%) from two departments (Educational Innovations in Science and Technology and Communication Design) whereas three Departments (Painting and Sculpture, Industrial Art and Integrated Rural Art and Industry) logged the least return rate (18.8%). The total return rate of the eQuestionnaire administered to the students (males = 65, females =38; $M_{age} = 28.9$ year) and lecturers (males = 21, females = 11; $M_{age} = 35.7$ years) represent 91.1% and 91.4, respectively, of the sample size ($n = 135$).

RESULTS AND DISCUSSIONS

1. Students and Lecturers cognisance of the KNUSTSpace and its adjunct services

Firstly, the study sought to inquire about Students and lecturers' awareness of the existence of the KNUSTSpace repository. The responses show that 87 (84.5%) students

were aware of the existence of KNUSTSpace. All the lecturers (100%) were mindful of the presence of KNUSTSpace.

Vis-à-vis where students and lecturers had information about the existence of the KNUSTSpace, it is apparent that students (38%) and lecturers (37.5%) heard off the KNUSTSpace through participation in a workshop/seminar organized by KNUST library (Figure 2). Additionally, other students (33.3%) became aware of the KNUSTSpace through colleagues/friends. Presentation by KNUSTSpace staff member at a faculty/University meeting was one of the channels through which some lecturers (21.8%) realized the existence of the KNUSTSpace.

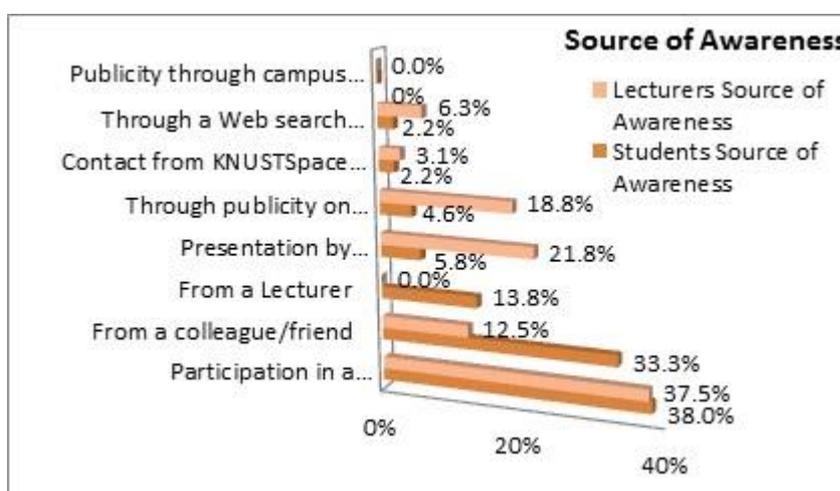


Fig. 2 Students and Lecturers knowledge of awareness of KNUSTSpace

2. On-campus Access to Internet connectivity and Electronic scholarly resources in KNUSTSpace

Low internet access remains one of the significant challenges to information availability in Ghana (Essel, 2010). As the internet is the backbone and the pathway of accessing KNUSTSpace, respondents were to specify whether they had reliable access to the internet on campus. Out of 103 students' responses, 102 (99%) indicated they had reliable access to the internet, while 1(1%) did not. For lecturers, all 32 (100%) responses specified they had reliable access to the internet on campus. Essel (2010) and Nunu et al. (2017) emphasized that the KNUST administration has made frantic effort to provide low latency and jitter-free hotspot internet access to all students and academic staffs on campus; hence, the justification for affirmative responses on the item involving internet accessibility and reliability.

From figure 3, responses relating to how students and lecturers' access KNUSTSpace on campus disclose that 80.5% of student respondents and lecturers (90.3%) access KNUSTSpace using the KNUST hotspot internet connectivity. Moreover, 35(40.2%) students and 20(64.5%) lecturers use their modem to access KNUSTSpace; and 50(57.5%) students and 13(41.9%) lecturers use their smart mobile phone internet to access KNUSTSpace.

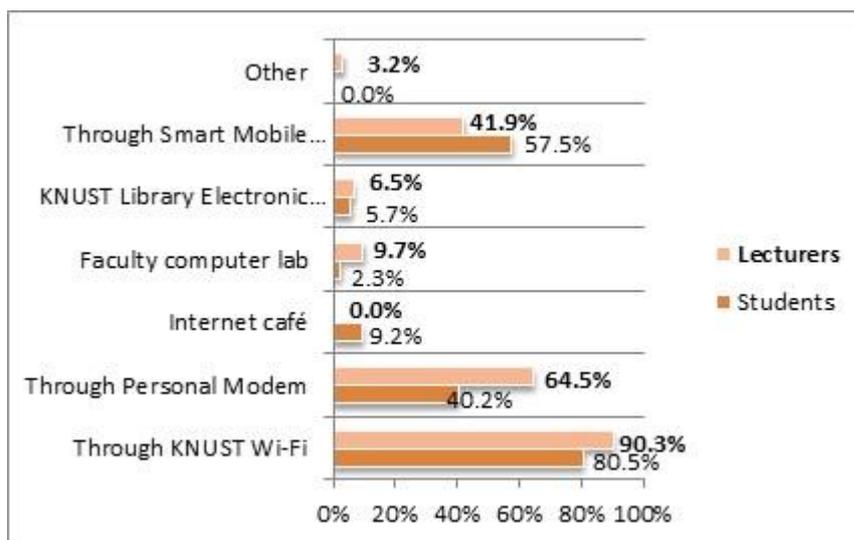


Fig. 3 students and lecturers' access to KNUSTSpace.

Figure 4 also discloses that majority (51.8%) students and 15(48.4%) lecturers' access KNUSTSpace through a web search engine.

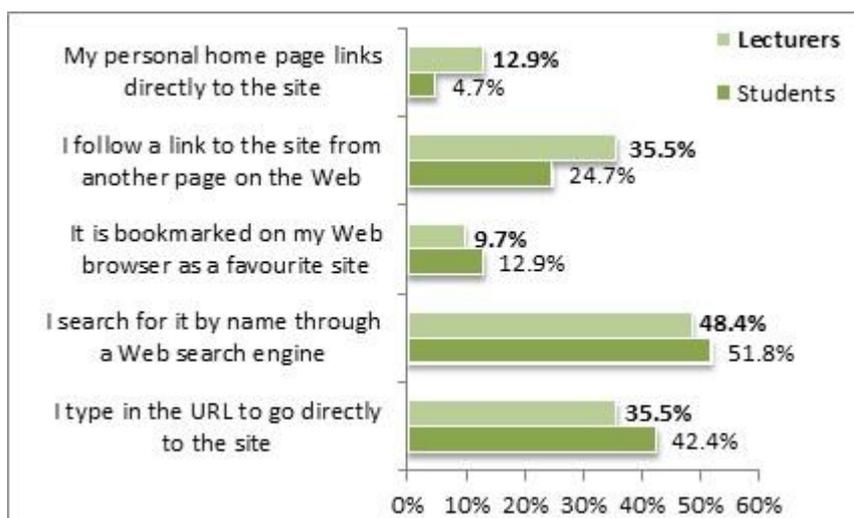


Fig. 4 Students' and lecturers' usual access point to KNUSTSpace.

3. Usage of Electronic scholarly resources in KNUSTSpace

Concerning students and lecturers frequent use of Electronic scholarly resources in KNUSTSpace, table 2 indicates that as high as 62 (60.2%) students and 23 (71.9%) lecturers

were occasional users. As low as 18 (17.5%) students and 3.1% of the lecturer respondents had never used the KNUSTSpace. However, the total numbers of occasional, monthly, weekly and daily users of the KNUSTSpace estimate at 85(82.5%) and 31(96.9%) for students and lecturer respondents respectively.

Table 2

Distribution of students and lecturers' frequent use of KNUSTSpace

Frequency of Use	Students (n = 85)	Lecturers (n = 31)
Occasional users	62 (60.2%)	23 (71.9%)
Never Used	18 (17.5%)	1 (3.1%)
Weekly users	10 (9.7%)	4 (12.5%)
Monthly users	7 (6.8%)	3 (9.4%)
Daily users	6 (5.8%)	-
Other (Very rare)	-	1 (3.1%)
Total of Numbers frequent users	85 (82.5%)	31 (96.9%)

Majority of the students (98.8%) indicated that they only use the repository to retrieve scholarly material since most of the scholarly outputs produced by academic staff and students are readily available (Table 3). The data in Table 3 also reveal that the majority of lecturers (54.8%) deposit and retrieve scholarly materials from the repository. However, a follow-up question was posed to solicit the lecturers motivation for depositing and retrieving scholarly materials from the repository; figure 5 discloses that majority (87.5%) of lecturers indicated it increase accessibility and visibility of their research work; 11(68.8%) lecturers stated that it creates publicity for their research work and impact on research community, and 9(56.3%) lecturers engage in collaborative research.

Table 3

Students and lecturers use of KNUSTSpace

Usage of KNUSTSpace	Students (n = 85)	Lecturers (n = 31)
I use the repository only to deposit scholarly materials	-	-
I use the repository only to retrieve scholarly materials	84 (98.8%)	14 (45.2%)
I use the repository to both deposit and retrieve scholarly materials.	1 (1.2%)	17 (54.8%)

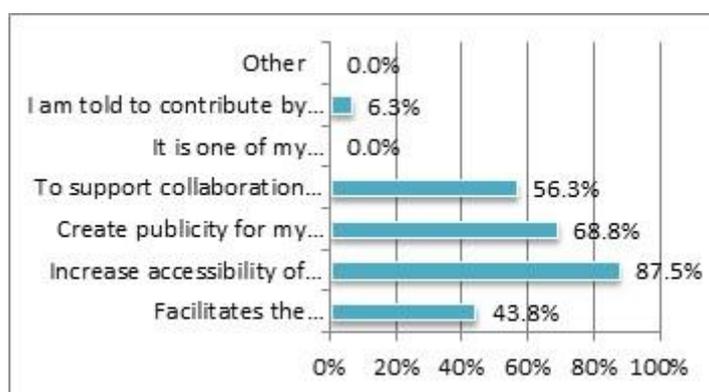


Fig.5 Reasons that motivates lecturers to deposit/submit contents into KNUSTSpace.

Seven (50%) of the academic staff (14) who only retrieved scholarly materials from the repository indicated that lack of information on how to upload content onto the IR hindered them from uploading their intellectual output; 4(28.6%) indicated they were working on their research work (thesis/dissertation), 4(28.6%) indicated other reasons; while 2(14.3%) indicated that additional time and effort required to perform self-archiving (fig. 6).

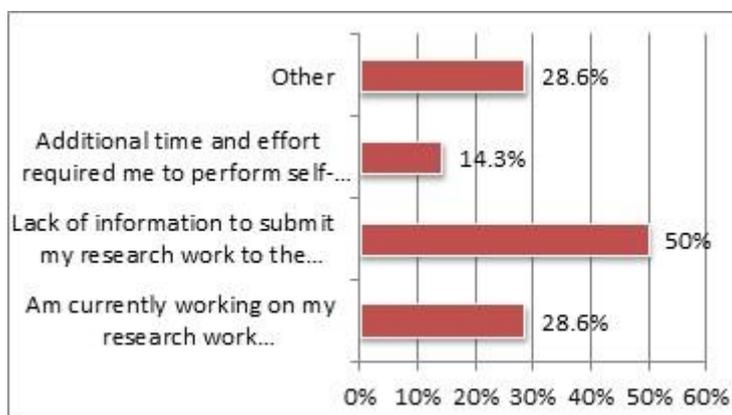


Fig. 6 Lecturers reasons for not depositing/submitting contents into KNUSTSpace.

From figure 7 it can be perceived that out of the 85 students and 31 lecturers who frequently use KNUSTSpace, as high as 81(95.3%) students and 30 (96.8%) lecturers indicated they use KNUSTSpace to download academic resources for their learning and research purposes. Majority of students (52.9%) indicated they use research outputs in KNUSTSpace as a source of reference towards the preparation of their thesis/dissertations, while lecturers' respondents (22.6%) indicated maximized visibility of their research outputs to the worldwide audience or scientific community.

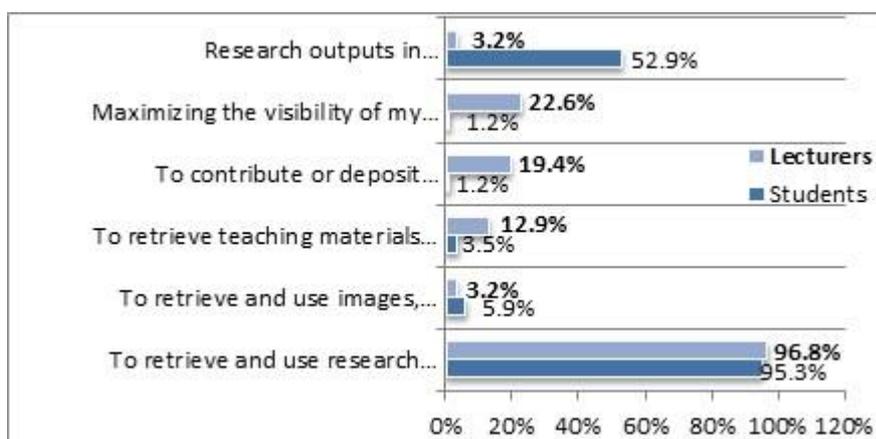


Fig. 7 Students and lecturers' purposes of using KNUSTSpace

4. Students and Lecturers Perceived Relevance of KNUSTSpace

The final segment of the questionnaire assessed the perceived relevance of the KNUSTSpace by the student and academic staff. From table 4, the majority of the students' respondents (57.7%) agreed that the resources in the KNUSTSpace are relevant to their research and educational needs. On the contrary, the majority of the lecturers' respondents (54.8%) were hesitant about the relevance of the resources in the KNUSTSpace.

Table 4

The relevance of resources/materials in the KNUSTSpace to students and lecturers needs.

Level of Agreement	Students	Lecturers
<i>Agree</i>	49(57.7%)	13(42%)
<i>Neutral</i>	35(41.2%)	17(54.8%)
<i>Disagree</i>	1(1.2%)	1(3.2%)

Further probe revealed that (fig. 8), 52.4% and 64.5% of students and lecturers respectively indicated their preference for educational videos in the KNUSTSpace which was

unavailable in the repository at the time of the study; additionally, students (34.1%) and lecturers (54.8%) suggested they would like to see the availability of Photos/images/ slide collections of lecture notes in the KNUSTSpace; however, students (34.1%) and lecturers (71%) indicated they would like to have their course materials/course outline and class resources in the KNUSTSpace.

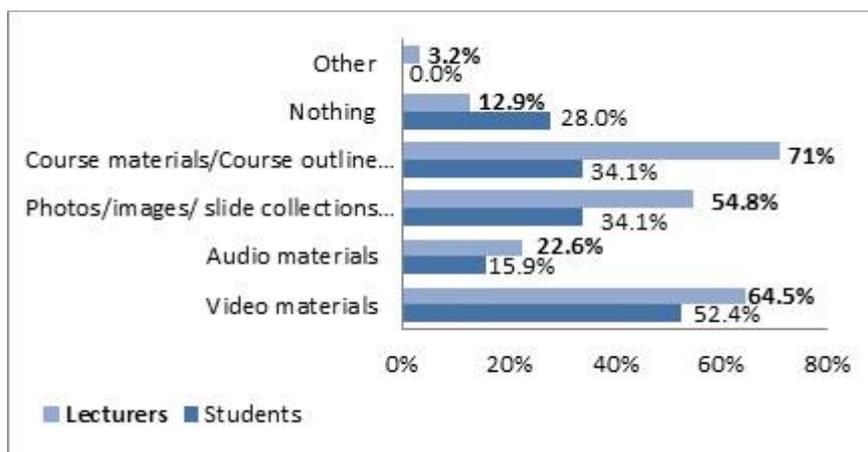


Fig. 8 Materials students and lecturers want to be available in KNUSTSpace that are not there currently.

On the ease of use of KNUSTSpace, table 5 indicates that as high as 67(80%) students and 25(80.7%) lecturers agreed that KNUSTSpace is easy to use; only 4(4.8%) students disagreed with the easing of usage of the repository. Concerning the question, “*I tend to find the information that I need quite quickly*”, table 6 indicates that 42(49.5%) students and 15(48.4%) lecturers’ agreed they tend to find the information that they need in KNUSTSpace quite quickly. Some of the lecturers (48.4%) remained neutral (neither agree nor disagree) about finding the information that they need effortlessly in the KNUSTSpace.

Table 5

Students and lecturers’ agreements on the ease of use of KNUSTSpace

Level of Agreement	Students	Lecturers
Agree	67(80%)	25(80.7%)
Neutral	13(15.3%)	6(19.4%)
Disagree	4(4.8%)	-

Table 6
Finding information in KNUSTSpace easily

Level of Agreement	Students	Lecturers
Agree	42(49.4%)	15(48.4%)
Neutral	31(36.5%)	15(48.4%)
Disagree	12(14.1%)	1(3.2%)

Concerning user experiences in the navigation of the repository, 51(60%) students and 15(48.4%) lecturers agreed that navigational assistance is available and helpful in searching scholarly contents in KNUSTSpace (table 7). Majority of the students (87.1%) and lecturers (77.4%) agreed that KNUSTSpace files are quick/easy to download (table 8) irrespective of the speed of the internet service.

Table 7
KNUSTSpace navigational assistance

Level of Agreement	Students	Lecturers
Agree	51(60%)	15(48.4%)
Neutral	26(30.6%)	12(38.7%)
Disagree	3(3.6%)	4(12.9%)

Table 8
Students and lecturers' views on a quick/easy download of KNUSTSpace files.

Level of Agreement	Students	Lecturers
Agree	74(87.1)	24(77.4%)
Neutral	7(8.2%)	5(8.2%)
Disagree	4(4.7%)	2(6.2%)

About the question, "KNUSTSpace materials are usually displayed in a format that is compatible with my computer/smartphone", majority of the students (88.1%) and lecturers

(77.5%) agreed that resources in the KNUSTSpace are usually displayed in a format that is compatible with their smart devices and computers (table 9).

Table 9

KNUSTSpace files format compatibility to students' and lecturers' digital devices.

Level of Agreement	Students	Lecturers
Strongly Agree	74(88.1%)	24(77.5%)
Neutral	7(8.3%)	7(22.6%)
Strongly Disagree	3(3.6%)	-

From the data, students and lecturers do encounter technical challenges when accessing the KNUSTSpace and its resources. Majority of the students (68.2%) and the lecturers (41.9%) confirmed by saying “Yes” they encounter technical challenges; and 27(31.8%) students and 18(58.1%) lecturers indicated “No”, they did not encounter any challenge in accessing KNUSTSpace.

A tabulation of data on the challenges students and lecturers encounter indicate that 58(68.2%) students and 13(41.9%) lecturers' encountered challenges such as limited access to computer terminal (table 11); while 43.1% and 63.6% of the students and the lecturers respectively indicated high-latency internet speed as a challenge (Fig 9).

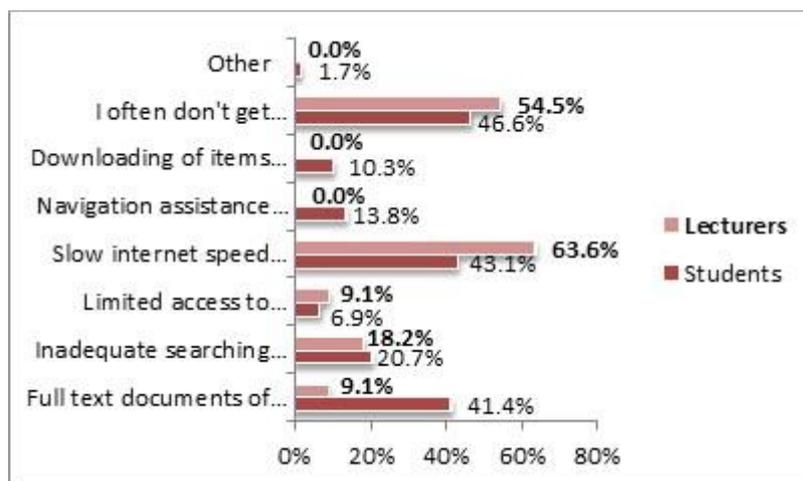


Fig. 9 Students and lecturers views on the kind of challenges they encountered when accessing KNUSTSpace.

DISCUSSIONS

The findings of this study evidenced that students and lecturers have full access to all the resources in KNUSTSpace. The institution also makes it possible for students and lecturers to access these resources by providing on-campus internet access. Several facilities such as the E-resource centre and research commons provide access privileges and quality training for academic staff and students on information literacy (Essel, 2010; Essel & Osei-Poku, 2011). Analysis of data collected on the awareness for this study indicated that the majority of students (84.5%) and lecturers (100%) were aware of the existence of KNUSTSpace. These findings confirm similar studies carried out at Dhaka University Library (Islam, Alam & Sultana, 2011), Iranian university libraries (Tajafari, 2014) and Akrofi - Christaller Institute of Theology, Missions and Culture (Budu, 2015) which demonstrated higher statistics of students and lecturers' awareness and usage of electronic scholarly resources in their IRs. The findings, moreover, indicated students and lecturers' sources of awareness of KNUSTSpace came through participation in a workshop/seminar organized by the KNUST library management, colleagues/friends and presentations by library staff at faculty/University meeting. These findings suggest that to some extent, the advocacy by KNUST library management on KNUSTSpace has had impact on students and academic staff in KNUST with regards to awareness and use. Besides, the prominence of interaction between colleagues/friends in KNUST on the repository somehow spiced up awareness and use of KNUSTSpace significantly; this confirms a study by Wolf's study (2001).

From the results, it was obvious that respondents frequently use a web search engine and a direct link to access the landing page of KNUSTSpace; and links from other IRs to KNUSTSpace. The use of search engines (Google, Yahoo, etc.) by scholars is mostly the first point of call (Ollé & Borrego, 2010) because of its ability to search for more comprehensive databases.

On the frequency of use of the repository, the majority of students (60.2%) and lecturers (71.9%) indicated that they were occasional users of KNUSTSpace though there were daily, weekly and monthly users a well. This indicates that students and academic staff used the resources in the repository on demand. Among the occasional, daily, weekly and monthly users, the majority of students (98.8%) use the repository to retrieve mainly theses/dissertations, while majority of the lecturers (54.8%) use the repository to deposit and retrieve scholarly materials. The academic staff were principally motivated to deposit/submit scholarly resources into KNUSTSpace due to the openness and popularity

of the repository (Alemayehu, 2010). The lecturers who only retrieved resources from the repository accentuated that the KNUSTSpace does not allow for self-archiving of intellectual outputs; moreover, there is little information on the processes for uploading documents on to the repository. According to the findings of Alemayehu (2010), users confronted with issues of uploading resources into an institutional repository turn to lose interest in showcasing their intellectual out to the scientific community through their IRs. Additionally, majority of students (95.3%) and lecturers (96.8%) indicated that they use academic resources from the KNUSTSpace for self-regulated learning and scientific research purposes; the finding supports a study carried out at the University of Southampton (Zuccala, Oppenheim & Dhiensa, 2008). The students (52.9%) also indicated that they use research outputs in KNUSTSpace to serve as a guide for preparing their thesis/dissertations, while the lecturers (22.6%) indicated they use KNUSTSpace to maximize the visibility of their intellectual outputs to worldwide. These show that there is high patronage of resources in the KNUSTSpace among students and lecturers (Ansari & Zuberi, 2010; Omotayo, 2010) in KNUST.

Students and lecturers agreed that the introduction of KNUSTSpace is relevant. Besides, they advocated for the management and technical team of the KNUSTSpace review the acceptance of documents in single media (text-based documents). Students and lecturers proposed the acceptance of multimedia documentations - educational videos, images, audio collections and animations - into the IR. Such multimedia resources are budding source of attraction of frequency users to the repository.

Students and lecturers appreciated the User Interaction (UI) and User Experience (UX) of the interface of the KNUSTSpace. The formats of the resources in the KNUSTSpace are compatible with the various devices used in accessing the content. However, the major challenges faced by users of IR are: not getting some of the scholarly resources that they needed in the repository; and, also not experiencing low-latency and jitter-free internet connectivity (Essel, 2010; Asemi & Riyahiniya, 2007) when access the KNUSTSpace.

Conclusion

The results reflect a higher awareness level of KNUSTSpace scholarly resources by students and lecturers. The primary sources of their awareness level were through their participation in workshops/seminars organized by KNUST library, from colleagues/friends and presentation by KNUSTSpace staff member at faculty/University meeting. The study has shown that the three ways by which respondents' access KNUSTSpace on campus

were through KNUST hotspot WIFI connection, using their smart mobile phone internet and personal modem. The students and lecturers were mainly occasional users of the repository. Notwithstanding the high level of usage by students and lecturers, the rate of the deposit of resources by these users was significantly low.

In order to remedy the identified hinderances to the cognisance, access and use of the repository, it is recommended that the University should form partnership/collaborate with Ghanaian institutions with Open Access Institutional Repositories (OA-IRs) to create a National Portal where their repositories will be on one platform for scholars to access diverse resources from these institutions and later extend it internationally. Moreover, the library should help populate the repository with past bound theses by converting them into electronic theses and dissertations (ETDs). Additionally, they should provide a periodic update of current electronic resources to meet research scholars' information needs. The university should endeavor to increase the bandwidth on campus to improve internet (Wi-Fi) access on KNUST campus towards upload and download scholarly resources from the KNUSTSpace. Lastly, the library should educate, promote and inform lecturers on how to submit contents into KNUSTSpace. The library should also create a users' suggestion column on the IR website, to help users to relay their needs and concerns to the IR manager/administrator or staff.

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Library Philosophy and Practice, March, 2020

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