

# Remote Access and Electronic Resources Use by Undergraduates in the Engineering Faculty of a University of Technology

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## ABSTRACT

*Electronic resources are vital to undergraduates' academic activities. However, literature reveals that undergraduates do not maximise the use of electronic resources in Nigeria because of remote access. This paper examined remote access and electronic resources use by undergraduates in the Engineering Faculty of a Nigerian University of Technology. The descriptive survey research design was adopted using quantitative methodology. A sample size of 394 was selected from the population of the study consisting of 3,924 undergraduates in the seven departments of the Engineering Faculty (Computer Engineering, Civil Engineering, Chemical Engineering, Mechanical Engineering, Electrical Electronics Engineering, Agricultural Engineering and Food Engineering). Data were collected using the questionnaire and analysed using descriptive statistics, mean and standard deviation, and Pearson's Product Moment Correlation at a 0.05 level of significance. The study found a significant relationship between remote access and undergraduate use of electronic resources ( $r = 0.18$ ,  $n = 394$ ,  $p (.001) < 0.05$ ). The result indicated that remote access to electronic resources enhanced the undergraduates' use of electronic resources in the university's Engineering Faculty. The findings imply that remote access to electronic resources improves the use of electronic resources for academic purposes. Therefore, it is recommended that academic libraries provide the necessary software that will foster remote access to the library's enormous electronic resources.*

**Keywords:** Remote access, electronic resources use, undergraduates, Engineering Faculty, University of Technology, Nigeria.

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## 1. INTRODUCTION

The 21<sup>st</sup> century is marked by a great degree of technological advancement coupled with a rapid increase in the amount of information available to individuals. Consequently, access to information has been made much easier than some decades ago. Members of a university community can now access information in locations distant from the university campus. Digital libraries have become the order of the day, and the paperless society has become more prominent. Consequently, information users are also more inclined to use electronic resources than print resources because of ease of access and the vast amount of information they provide (Bhat, 2019).

Electronic resources (e-resources) are electronic storehouses for information. They are available in a wide range of formats and can be accessed from different locations. They are easily accessible, easy to search out, and can be interacted with. They also provide links to multiple resources from which information can be accessed (Ankrah and Atuase, 2018). Various types of resources that students can access are e-books, digital collections, databases, catalogues, reference services, online tutorials, e-journals, e-conference proceedings, e-manuscripts, e-maps, Websites, CDs/DVDs, etc. (Kavithanjali, 2019). E-resources can be accessed directly through computer networks or remotely via carriers such as compact discs, cassettes, etc. The most common digital device students use to access e-resources is the Smartphone. Students use this device because it makes it easier for them to access library resources without being physically present in the library (Tella et al., 2021).

E-resources are imperative in learning and research by enhancing undergraduates' access to global electronic information resources for scholarly activities (Ebijuwa and Mabawonku, 2019). Libraries make investments in e-resources so that they can be available to users. These investments would be worth it if patrons make use of them. One of the ways to ensure this is by making it possible for them to access these resources from wherever they are by using remote access tools such as the technology known as Virtual Private Network (VPN), Remote Desktop services, direct line, etc. (Yfantis, 2018). When students are unaware of the availability of these resources, or in cases where there are no channels provided for them to access them remotely, they may not be able to make maximum use of them. In developed countries, students can access e-resources freely from distant locations from the school library. The same cannot be boldly said about the University libraries in Nigeria. Based on this backdrop, this study seeks to investigate the remote access and electronic resources use by undergraduates in the Engineering Faculty of a University of Technology.

### 1.1. Objectives of the study

The main objective of the study is to investigate remote access and electronic resources use by undergraduates in the Engineering Faculty of a University of Technology.

The specific objectives are to:

1. identify remotely accessed resources used by undergraduates in the Engineering Faculty;
2. know the device sources and formats preferred for e-resources use by undergraduates in the Engineering Faculty;
3. examine the degree of usefulness of e-resources used by undergraduates in the Engineering Faculty;
4. identify the determinants of e-resources use by undergraduates in the Engineering Faculty;
5. examine the remote access search techniques for e-resource use by undergraduates in the Engineering Faculty;
6. identify the training/orientation possessed to use remotely accessed information by undergraduates in the Engineering Faculty;
7. identify problems encountered by undergraduates in the Engineering Faculty while using e-resources and services.

### 1.2. Research questions

- RQ<sub>1</sub>*. What are the remotely accessed resources used by undergraduates in the Engineering Faculty?  
*RQ<sub>2</sub>*. What device sources and formats are preferred for e-resources use by undergraduates in the Engineering Faculty?  
*RQ<sub>3</sub>*. What is the degree of usefulness of e-resources used by undergraduates in the Engineering Faculty?  
*RQ<sub>4</sub>*. What are the determinants of e-resources use by undergraduates in the Engineering Faculty?  
*RQ<sub>5</sub>*. What remote access search techniques are used by undergraduates in the Engineering Faculty?  
*RQ<sub>6</sub>*. What training/orientation do undergraduates in the Engineering Faculty possess to use remotely accessed information?  
*RQ<sub>7</sub>*. What problems are encountered by undergraduates in the Engineering Faculty while using e-resources and services?

### 1.3. Hypothesis

The null hypothesis was tested in the study at  $p < 0.05$  level of significance:

*H<sub>0</sub>*: There is no significant relationship between remote access and use of electronic resources by undergraduates in the Engineering Faculty of a University of Technology.

## 2. LITERATURE REVIEW

### 2.1. Electronic Resources in University Libraries

The fact that University undergraduates have a variety of information needs is indubitable. Besides the need to use information to complete assignments, term papers, and research projects, undergraduates also need information to fill their gap in knowledge in the social, financial, emotional, and other facets of their lives. These diverse kinds of information can be obtained from either printed or electronic resources. The provision of these resources to students aims to ensure that they can access the information needed to thrive and excel in their academics. (Toyo, 2017 and Alabi, 2021).

The advent of electronic resources for information dissemination and the rapid development of electronic publishing has positively influenced the operations and service delivery in academic libraries. One dimension of this is that access to information is given more priority than ownership (Idiegbeyan Ose et al., 2019 and Baskar, 2017). E-resources have become indispensable in higher education, and researchers have embraced them on the realisation of their importance. Most academic research works are now heavily dependent on these resources as they have made it easier for researchers to access information and knowledge (Anyim, 2018 and Dayakar, 2018).

The 21<sup>st</sup>-century students, who are more inclined to technology, have also found electronic resources helpful in pursuing their academic endeavours and general learning. In addition, the traditional libraries were focused on housing information items in a physical space. However, today, most libraries cannot provide the structural facilities and space required to store new print information resources because of the rapid increase in information associated with the unending advancement in technology. Electronic resources, therefore, help to conserve and decongest the already crowded academic library spaces and organise library collections in more innovative ways (Sejane, 2017; Sadiku, Issa and Mohammed, 2019). Studies by scholars including Adeleke and Nwalo (2017);

Gbotosho (2019); Salman, Ahmed, Raheem and Pelemo (2020) on availability, accessibility and use of e-resources among undergraduates revealed that the Internet and e-books were the most accessible of the electronic resources used in university libraries.

### **2.2. Use of Electronic Resources by Undergraduates**

A review of literature showed that a good number of studies have been carried out on electronic resources' use by undergraduates (Daramola, 2016; Owolabi, Idowu, Okocha and Ogundare, 2016; Urhiewhu and Omah, 2016; Aladeniyi and Owokole, 2018; Adedokun and Fawole, 2018; Ebijuwu, 2018; Ebijuwu and Mabawonku, 2019; Gbotosho, 2019). They found that undergraduates use e-resources to complete assignments and acquire general information.

A recent study by Alabi (2021) on the use of electronic resources by undergraduates in selected private university libraries in South West Nigeria also reveals that undergraduates used e-resources regularly to complete their assignments and other academic purposes. Poor internet connection and epileptic power supply were also identified as factors that hamper the use of these resources by the students. Another study by Gunasekera, Alahakoon and Dissanayake (2021) on e-resource use by undergraduates at the University of Peradeniya indicated a low use of e-resources by the students. It was observed that while the students use e-resources, they prefer print resources above e-resources. Their most preferred databases are Oxford and HINARI, and the most popular search technique is scratching through the title.

### **2.3. Remote Access of Electronic resources by Undergraduates**

There is a dearth of literature on remote access of electronic resources with a particular focus on undergraduates. In view of this, literature was examined with respect to remote access of electronic resources by students of higher institutions in general.

Nyakweba (2016), in a study to examine remote access of e-resources by distance learning students of the University of Nairobi found that while remote access is available to the university library's electronic resources, most of the students do not possess the required skills for remote e-resource search, which makes the location of relevant information a herculean task. It was suggested that students be trained to access these resources with ease. Conversely, a study on perception and satisfaction level of remote login access users in Kasturba Medical College Health Sciences Library by Jayalakshmi, Rao, and Bhat (2018) revealed that all the respondents were aware of and had made use of the remote access facility of the library at different points in time. A good number of the respondents (37.1%) expressed a high rate of satisfaction using the remote access facility, 51.4% were satisfied, and 11.4% were unsure about their satisfaction rate. In terms of usefulness, 59.21% (45) of the respondents noted that the remote access facility is highly useful, 34.21% (26) indicated that it is useful, and 6.58% (5) could not ascertain the usefulness.

Another study by Bhat (2019) revealed that the Allama Iqbal Library provides platforms for remote access of e-resources and services to staff and students of the University of Kashmir. Software like EZproxy and RemoteX have been adopted to foster remote access to the library's electronic resources. The library's patrons have been able to access e-resources from remote locations since 2010 using EZproxy. The library upgraded to RemoteX, which provides unlimited and timeless access to the library's vast amount of electronic resources in 2019. Findings reveal that the various user

groups of the library were making good use of the electronic resources based on the widespread awareness about the availability of these resources. They also have access to laptops, mobile devices and tablets, which aid easy remote access to the resources. The library recorded a decline in the number of printed journals and a simultaneous rise in the number and use of electronic ones due to easy availability and accessibility. This clearly depicts the relevance of electronic resources in today's library.

### 3. METHODOLOGY

#### 3.1. Research design

The study adopted a quantitative methodology using a descriptive survey research design. The population of this study consisted of 4,749 undergraduates in the Engineering Faculty of the University of Technology. There are seven departments in the Engineering Faculty of the University of Technology, as contained in Table 1. All students in the seven departments were included in this study except 100 level students who were not fully registered at the library during the questionnaire administration.

In the seven departments, the total number of students, excluding 100 level students, was 3,924. Due to the large number of students in the selected departments, a sampling fraction of 10% was drawn from the total number of students in the departments to ensure a representative sample reflecting the selected departments. This gave a sample size of 394 (See Table 2).

Permission was obtained from the heads of the departments of the selected universities by the researcher and trained research assistants. The questionnaire cover page contained a letter to the respondents, introducing the survey and the researcher, describing the reasons for the survey, and soliciting their help in promptly filling and returning the questionnaire, along with the promise of anonymity of the respondents and confidentiality of the information supplied.

The data collected for this study were collated and analysed using descriptive statistics of frequency counts, percentages, mean and standard deviation for the research question. The research hypothesis was tested using Pearson Product Moment Correlation (PPMC) at 0.05 level of significance. Statistical Package for Social Sciences (SPSS) was used for computing and analysing the data generated for the study.

Table 1: Population of the study

Department	100 level	200 level	300 level	400 level	500 level	Total
Agricultural Engineering	81	153	74	50	45	403
Chemical Engineering	52	74	67	126	83	402
Civil Engineering	198	249	147	169	66	829
Computer Engineering	152	142	265	314	255	1,128

Electrical Electronic Engineering	155	203	105	145	82	690
Food Engineering	19	49	99	234	143	544
Mechanical Engineering	168	209	119	142	115	753
<b>Total</b>	<b>825</b>	<b>1,079</b>	<b>876</b>	<b>1,180</b>	<b>789</b>	<b>4,749</b>

Source: Academic Planning Unit of the University (2020/2021 session)

**Table 2: Sample size**

Department	200 level	300 level	400 level	500 level	Total	10% sample
Agricultural Engineering	153	74	50	45	322	32
Chemical Engineering	74	67	126	83	350	35
Civil Engineering	249	147	169	66	631	63
Computer Engineering	142	265	314	255	976	98
Electrical Electronic Engineering	203	105	145	82	535	54
Food Engineering	49	99	234	143	525	53
Mechanical Engineering	209	119	142	115	585	59
<b>Total</b>					<b>3,924</b>	<b>394</b>

Source: Academic Planning Unit of the University (2020/2021 session)

## 4. RESULTS

### 4.1. Demographic characteristics of the respondents

The respondents' demographic characteristics (Department of study, gender, age and level) were analysed using descriptive statistics (frequency counts and percentages), and the result is presented in Table 3.

**Table 3: Demographic characteristics of the respondents**

Department	Frequency	Percentage
Computer Engineering	98	24.9
Civil Engineering	63	16.0
Chemical Engineering	35	8.9
Mechanical Engineering	59	15.0
Electrical Electronics Engineering	54	13.7
Agricultural Engineering	32	8.1
Food Engineering	53	13.5
Total	394	100.0

Gender	Frequency	Percentage
Male	260	66.0
Female	134	34.0
Total	394	100.0
Age	Frequency	Percentage
14-16 years	8	2.0
17-19 years	118	29.9
20-22 years	157	39.8
23-25 years	61	15.5
26-28 years	46	11.7
29-30 years	4	1.0
Total	394	100.0
Level of study	Frequency	Percentage
200 level	96	24.4
300 level	111	28.2
400 level	92	23.4
500 level	95	24.1
Total	394	100.0

The demographic characteristics of the respondents by departments, as presented in Table 3, show that 98(24.9%) students are from Computer Engineering, 63(16.0%) are from Civil Engineering, 35(8.9%) are from Chemical Engineering, 59(15.0%) are from Mechanical Engineering, 54(13.7%) are from Electrical Electronics Engineering, 32(8.1%) are from Agricultural Engineering, and 53(13.5%) are from Food Engineering. From the results, it can be inferred that most of the respondents 98(24.9%) were from Computer Engineering, followed by Civil Engineering 63(16.0%), while the least respondents 32(8.1%) were from Agricultural Engineering.

Results from analysed data on gender reveal that there were more male respondents, 260(66.0%) than female respondents, 134(34.0%). Data collected on respondents' age show that 8(2.0%) of the students are between 14-16 years of age, 118(29.9%) are between 17-19 years, 157(39.8%) are between 20-22 years, 61(15.5%) are between 23-25 years, 46(11.7%) are between 26-28 years, and 4(1.0%) are between 29-30 years of age respectively. This implies that most of the respondents, 157(39.8%), were found within the age range of 20-22 years, while the least respondents, 4(1.0%), are between 29-30 years. The table also showed that the highest number of respondents, 96(24.4%), were in 200 level, 111(28.2%) were in 300 level, 92(23.4%) were in 400 level, and 95(24.1%) were in 500 level.

The implication of the respondents' demographic characteristics to the remote access and electronic resources use is that undergraduates' departments, gender, age and the level of study ought not to be an obstacle to the use of electronic resources. Therefore, regardless of their departments, gender, age and level of study, they should attempt to make good use of e-resources.

**Table 7: Distribution of respondents by ownership of mobile devices**

Do you own a mobile device?	Frequency	Percentage
No	12	3.0
Yes	382	97.0
Total	394	100.0

Table 7 shows that the majority, 382(97.0%) of the students, own a mobile device, and 12(3.0%) do not own a mobile device.

**Table 8: Mobile device owned by undergraduate**

Mobile device owned	Frequency	Percentage
Not applicable	12	3.0
Smartphone	350	88.8
Tablet	16	4.1
Laptop	16	4.1
Total	394	100.0

Table 8 presents data on the type of mobile device owned by undergraduates. The result reveals that most undergraduates, 350(88.8%), own a Smartphone, while the same number of undergraduates, 16(4.1%), own a tablet or laptop.

**Table 9: Purpose of use of mobile devices by undergraduates**

s/n	Purpose of using mobile devices	No	Yes
1	For calling friends	147(37.3%)	247(62.7%)
2	For playing games	239(60.7%)	155(39.3%)
3	For sending and receiving SMS messages	155(39.3%)	239(60.7%)
4	For educational purposes	52(13.2%)	342(86.8%)
5	Others	310(78.7%)	84(21.3%)

Table 9 shows the purpose of use of mobile devices. Results reveal that 342(86.8%) of the students use their mobile devices for educational purposes, 247(62.7%) for calling friends, 239(60.7%) for sending and receiving SMS messages, 155(39.3%) for playing games, and 84(21.3%) for other purposes. Therefore, it can be inferred that the students use their mobile devices primarily for educational purposes, followed by calling friends.

#### 4.2. Answers to research questions

The seven research questions in the study were analysed, and the results are presented below.

**Research question one:** What are the remotely accessed resources used by undergraduates in the Engineering Faculty?

**Table 10: Types of remotely accessed resources used by undergraduates**

s/n	Types of e-resources available	No	Yes
1	e-journals	255(64.7%)	139(35.3%)
2	e-books	159(40.4%)	235(59.6%)
3	Books-in-print Database (BIPD)	303(76.9%)	91(23.1%)
4	Electronic theses and dissertations	334(84.8%)	60(15.2%)
5	Digital repository	347(88.1%)	47(11.9%)
6	Staff publication	306(77.7%)	88(22.3%)
7	Others	374(94.9%)	20(5.1%)

Table 10 shows the type of remotely accessed resources used by undergraduates. The e-book was the most accessed e-resource used by undergraduates in the Engineering Faculty. It was followed by e-journals, Books-in-Print Database (BIPD), staff publication, electronic theses and dissertations, and digital repositories. It can be inferred that e-books are the most remotely accessed e-resources by

undergraduates, followed by e-journals. Of the e-resources mentioned, staff publications are the least remotely accessed.

**Table 11: Types of online information services available for students in the University Library**

s/n	Types of online information services	No	Yes
1	Online Public Access Catalogue	196(49.7%)	198(50.8%)
2	Electronic newsletters and journals	263(66.8%)	131(33.2%)
3	Current awareness services	334(84.8%)	60(15.2%)
4	Blogs	326(82.7%)	68(17.3%)
5	Online reference service	330(83.8%)	64(16.2%)
6	Online tutorials	286(72.6%)	108(27.4%)
7	Electronic theses and dissertation	334(84.8%)	60(15.2%)
8	Web portal	251(63.7%)	143(36.3%)
9	Others	378(95.9%)	16(4.1%)

Table 11 shows the types of online information services available for students in the University library. Online Public Access Catalogue was the most available online information service for students. It was followed by Web portals, Electronic newsletters and journals, Online tutorials, Blogs, Online reference services, Current awareness services, and lastly, Electronic theses and dissertations. It can be inferred that the Online Public Access Catalogue was the most available online information service accessible to students, while of the other mentioned online information services, current awareness services, and electronic theses and dissertations were the least available.

**Research question two:** What device source and format do you prefer for e-resources use by undergraduates in the Engineering Faculty?

**Table 12: Identification of use device sources of e-resources**

s/n	Devices used	Never	Occasionally	Monthly	Weekly	Daily	$\bar{x}$	S.D
1	Laptop	103 26.1%	184 46.7%	24 6.1%	36 9.1%	47 11.9%	2.34	1.284
2	Palmtop	228 57.9%	83 21.1%	51 12.9%	24 6.1%	8 2.0%	1.73	1.033
3	Desktop	179 45.4%	147 37.3%	40 10.2%	24 6.1%	4 1.0%	1.80	0.923
4	Smartphone	96 24.4%	88 22.3%	16 4.1%	55 14.0%	139 35.3%	3.13	1.655
5	Tablet	196 49.7%	103 26.1%	28 7.1%	27 6.9%	40 10.2%	2.02	1.327
6	iPad	203 51.5%	95 24.1%	40 10.2%	28 7.1%	28 7.1%	1.94	1.241
<b>Weighted Mean = 2.16</b>								

Table 12 shows the device source preferred for e-resources use by undergraduates in the Engineering Faculty. Smartphone ( $\bar{x}$ =3.13) was the major device source and format preferred for e-resources use by undergraduates and was followed by "Laptop" ( $\bar{x}$ =2.34), "Tablet" ( $\bar{x}$ =2.02), "iPad" ( $\bar{x}$ =1.94), "Desktop" ( $\bar{x}$ =1.80), and lastly by "Palmtop" ( $\bar{x}$ =1.73) respectively. It can be inferred that

the Smartphone is the most preferred device source for e-resources, followed by the laptop. The palmtop is the least used device source for e-resources.

**Table 13: The format preferred for accessing e-resources by undergraduates**

s/n	Format of e-resources	Not preferred	Preferred	More preferred	Most preferred	$\bar{x}$	S.D
1	HTML	135 34.3%	87 22.1%	96 24.4%	76 19.3%	2.29	1.131
2	PowerPoint	64 16.2%	154 39.1%	84 21.3%	92 23.4%	2.52	1.022
3	MS word	75 19.0%	88 22.3%	76 19.3%	155 39.3%	2.79	1.156
4	PDF	32 8.1%	43 10.9%	44 11.2%	275 69.8%	3.43	0.976
<b>Weighted Mean = 2.76</b>							

Table 13 shows the format preferred for accessing e-resources by undergraduates in the Engineering Faculty. The order of e-resource format preference of the undergraduates is PDF ( $\bar{x}$ =3.43), MS Word ( $\bar{x}$ =2.79), PowerPoint ( $\bar{x}$ =2.52), and lastly by HTML ( $\bar{x}$ =2.29) respectively. It can be inferred from the results that the most preferred format for accessing e-resources by undergraduates is PDF, while the least preferred format is HTML.

**Research question three:** What is the degree of usefulness of e-resources used by undergraduates in the Engineering Faculty?

**Table 14: Degree of usefulness of the e-resources used by undergraduates**

s/n	Sources of e-resources	Not useful	Useful	Slightly useful	Moderately useful	Highly useful	$\bar{x}$	S.D
1	Books-in-Print Database (BIPD)	60 15.2%	79 20.1%	56 14.2%	96 24.4%	103 26.1%	3.26	1.427
2	E-journal	40 10.2%	55 14.0%	80 20.3%	115 29.2%	104 26.4%	3.48	1.292
3	E-book	28 7.1%	76 19.3%	52 13.2%	67 17.0%	171 43.4%	3.70	1.376
4	OPAC	83 21.1%	71 18.0%	96 24.4%	80 20.3%	64 16.2%	2.93	1.369
5	Electronic Theses and Dissertation	88 22.3%	82 20.8%	80 20.3%	76 19.3%	68 17.3%	2.88	1.406
6	Digital Repository	60 15.2%	128 32.5%	75 19.0%	76 19.3%	55 14.0%	2.84	1.290
7	Staff Publication	88 22.3%	124 31.5%	48 12.2%	58 14.7%	76 19.3%	2.77	1.442
<b>Weighted Mean = 3.12</b>								

Table 14 shows the degree of usefulness of e-resources used by undergraduates in the Engineering Faculty. The undergraduates found e-books highly useful ( $\bar{x}$ =3.70), followed by e-journals ( $\bar{x}$ =3.48). The students found staff publications ( $\bar{x}$ =2.77) least useful.

**Table 15: Test of norm showing the degree of usefulness of e-resources used by undergraduates**

Interval	Mean index	Degree of usefulness	Frequency	Percentage
1-7		Not useful	8	2.0
8-14		Useful	48	12.2
15-21	<b>21.86</b>	Slightly useful	123	31.2
22-28		Moderately useful	155	39.3
29-35		Highly useful	60	15.2

Table15 shows the percentage degree of usefulness of e-resources used by undergraduates in the Engineering Faculty. 2.0% (n=8) undergraduate showed not useful, 12.2% (n=48) showed useful, 31.2% (n=123) showed slightly useful, 39.3% (n=155) showed moderately useful, and 15.2% (n=60) showed highly useful. Majority of the students 39.3% (n=155) found e-resources moderately useful while the least percentage 2.0% (n=8) found them not useful. Overall, it can be inferred that the e-resources used by undergraduates in the Engineering Faculty are moderately useful.

**Research question four:** What are the determinants of e-resources use by undergraduates in the Engineering Faculty?

**Table 16: Factors determining the choice of e-resources in the area of research**

s/n	Factors determining the choice of e-resources	No	Yes
1	Accuracy	116(29.4%)	278(70.6%)
2	Reliability	155(39.3%)	239(60.7%)
3	Relevance	231(58.6%)	163(41.4%)
4	Convenience	179(45.4%)	215(54.6%)
5	Accessibility	154(39.1%)	240(60.9%)
6	Proximity	275(69.8%)	119(30.2%)
7	Timeliness	262(66.5%)	132(33.5%)
8	Speed	223(56.6%)	171(43.4%)
9	Others	362(91.9%)	32(8.1%)

Table 16 shows the determinants of e-resources use by undergraduates in the Engineering Faculty. 278(70.6%) of the students admitted accuracy as a determinant, 240(60.9%) accessibility, 239(60.7%) reliability, 215(54.6%) convenience, 171(43.4%) speed, 163(41.4%) relevance 132(33.5%) timeliness, 119(30.2%) proximity, and 32(8.1%) other factors which were not disclosed in the context of the research. It can be inferred that the most determinant factor in the choice of e-resources by undergraduates is accuracy, followed by accessibility. In contrast, the least determinant of the factors mentioned is proximity.

**Research question five:** What remote access search techniques are used by undergraduates in the Engineering Faculty?

**Table 17: Remote access search techniques used by undergraduates**

s/n	e-resource search techniques	Never applied	Rarely applied	Often applied	Quite often applied	Very often applied	$\bar{x}$	S.D
1	One keyword	100 26.4%	108 27.4%	100 25.4%	35 8.9%	51 12.9%	2.57	1.308
2	More than one	87	116	108	28	55	2.61	1.289

	keyword	22.1%	29.4%	27.4%	7.1%	14.0%		
3	Directly to URL	83 21.1%	112 28.4%	116 29.4%	31 7.9%	52 13.2%	2.64	1.267
4	Boolean Operators (OR, AND, NOT)	87 22.1%	139 35.3%	88 22.3%	56 14.2%	24 6.1%	2.47	1.159
5	Truncation, e.g. Library	83 21.1%	91 23.1%	120 30.5%	64 16.2%	36 9.1%	2.69	1.229
6	Use of Hyperlinks	92 23.4%	69 17.3%	104 26.4%	71 18.0%	59 15.0%	2.84	1.366
7	Subject searching	52 13.2%	75 19.0%	112 28.4%	71 18.0%	84 21.3%	3.15	1.316
8	Author/Title search	47 11.9%	88 22.3%	112 28.4%	71 18.0%	76 19.3%	3.10	1.283
<b>Weighted Mean = 2.76</b>								

Table 17 shows the remote access search techniques used by undergraduates in the Engineering Faculty. "Subject searching" ( $\bar{x}$ =3.15) was ranked highest by the mean score as the major remote access search technique used by undergraduates in the Engineering Faculty. This was followed by "Author/Title search" ( $\bar{x}$ =3.10), "Use of Hyperlinks" ( $\bar{x}$ =2.84), "Truncation, e.g. Library" ( $\bar{x}$ =2.69), "Directly to URL" ( $\bar{x}$ =2.64), "More than one keyword" ( $\bar{x}$ =2.61), "One keyword" ( $\bar{x}$ =2.57), and lastly, "Boolean Operators (OR, AND, NOT)" ( $\bar{x}$ =2.47) respectively.

**Table 18: Skills adopted when remotely searching for e-resources**

s/n	Skills adopted when remotely searching for e-resources	No	Yes
1	Navigational skills	262(66.5%)	132(33.5%)
2	Filtering skills	326(82.7%)	68(17.3%)
3	Advanced search skills	171(43.4%)	223(56.6%)
4	None of the above	350(88.8%)	44(11.2%)

Table 18 shows the skill adopted when remotely searching for e-resources. Advanced search skills were the major skills adopted 223(56.6%), and was followed by navigational skills 132(33.5%), and lastly, filtering skills 68(17.3%).

**Table 19: Evaluation status of the quality of information retrieved**

Do you evaluate the quality of information you retrieve?	Frequency	Percentage
No	76	19.3
Yes	318	80.7
Total	394	100.0

Table 19 shows that 80.7% of the undergraduates evaluate the quality of information retrieved, and 19.3% do not evaluate the information retrieved. It can be inferred that most of the undergraduates evaluate the quality of the information retrieved.

**Research question six:** What training/orientation do undergraduates in the Engineering Faculty possess to use remotely accessed information?

**Table 20: Training or orientation possessed on how to use remotely accessed information**

s/n	Training or orientation possessed	No	Yes
1	Library organised remote access training	275(69.8%)	119(30.2%)
2	Search and retrieval course	267(67.8%)	127(32.2%)
3	Workshop and seminar on internet use by faculties	263(66.8%)	131(33.2%)
4	External training in other institutions or centres	310(78.7%)	84(21.3%)
5	Peer tutoring	262(66.5%)	132(33.5%)

Table 20 shows the training/orientation undergraduates in the Engineering Faculty possess to use remotely accessed information. The primary training possessed is peer tutoring. This was followed by workshops/seminars on internet use, search and retrieval courses, remote access training, and external training. It can be inferred that undergraduates are mostly trained about using remotely accessed information by their peers or colleagues 132(33.5%), closely followed by workshops and seminars on internet use by faculties 131(33.2%). The least avenue for the orientation of the students on how to use remotely accessed information is external training in other institutions or centres 84(21.3%).

**Research question seven:** What problems are encountered by undergraduates in the Engineering Faculty while using e-resources?

**Table 21: Problems encountered while using e-resources**

s/n	Problems encountered	SD	D	U	A	SA	$\bar{x}$	S.D
1	Information overload (or too much information)	64 16.2%	116 29.4%	68 17.3%	83 21.1%	63 16.0%	2.91	1.338
2	The need to filter the results from search	64 16.2%	83 21.1%	96 24.4%	115 29.2%	36 9.1%	2.94	1.232
3	Download delay	52 13.2%	103 26.1%	83 21.1%	116 29.4%	40 10.2%	2.97	1.222
4	Problem with the credibility of information	71 18.0%	104 26.4%	84 21.3%	103 26.1%	32 8.1%	2.80	1.239
5	Failure to find information	80 20.3%	118 29.9%	84 21.3%	88 22.3%	24 6.1%	2.64	1.205
6	Lack of search skills	96 24.4%	147 37.3%	103 26.1%	32 8.1%	16 4.1%	2.30	1.052
7	High cost of access	72 18.3%	150 38.1%	84 21.3%	56 14.2%	32 8.1%	2.56	1.178
8	Power outage	52 13.2%	124 31.4%	83 21.1%	87 22.1%	48 12.2%	2.89	1.242
9	Inaccessibility of some websites	63 16.0%	108 27.4%	104 26.4%	91 23.1%	28 7.1%	2.78	1.176
10	Difficulties in the navigation of some websites	48 12.2%	134 34.0%	92 23.4%	92 23.4%	28 7.1%	2.79	1.142
<b>Weighted Mean = 2.76</b>								

Table 21 shows the problems encountered by undergraduates in the Engineering Faculty while using e-resources. "Download delay" ( $\bar{x}$ =2.97) was ranked highest by the mean score rating as the major problem encountered by undergraduates while using e-resources and was followed in succession by "The need to filter the results from search" ( $\bar{x}$ =2.94), "Information overload (or too much information)"

( $\bar{x}$  =2.91), "Power outage" ( $\bar{x}$  =2.89), "Problem with credibility of information" ( $\bar{x}$  =2.80), "Difficulties in the navigation of some websites" ( $\bar{x}$  =2.79), "Inaccessibility of some websites" ( $\bar{x}$  =2.78), "Failure to find information" ( $\bar{x}$  =2.64), "High cost of access" ( $\bar{x}$  =2.56), and lastly by "Lack of search skills" ( $\bar{x}$  =2.30) respectively.

Hence, the problems encountered by undergraduates in the Engineering Faculty while using e-resources and services include download delay, difficulties in filtering results from a search, information overload, power outage, credibility of information challenges, difficulties in the navigation of some websites, and inaccessibility of some websites.

### 4.3. Hypothesis

**Hypothesis:** There is no significant relationship between remote access and undergraduate' use of electronic resources in the Engineering Faculty of a University of Technology

**Table 22: Pearson Product Moment Correlation (PPMC) showing the relationship between remote access resources and use of electronic resources**

Variables	Mean	Std. Dev.	n	r	p-value	Remarks
Remotely accessed resources	3.8782	3.08743	394	.181*	.001	Sig.
Use of electronic resources	49.8832	12.15618				

\* Sig. at 0.05 level

Table 22 shows that there is a significant relationship between remote access and undergraduate' use of electronic resources in the Engineering Faculty of a University of Technology ( $r = .181$ ,  $n = 394$ ,  $p (.001) < .05$ ). Hence, the hypothesis is rejected. This implies that remote access to electronic resources enhanced the use of electronic resources by undergraduates in the study.

## 5. DISCUSSION AND CONCLUSION

### 5.1. Discussion of findings

Findings show that most of the students use their mobile devices, mainly mobile phones, for educational purposes. This is in line with the findings of a study by Mwabungulu and Mungwabi (2017) on the impact of Smartphone usage on third-year undergraduates of the University of Dar es Salaam. The study revealed that the students use their smartphones primarily for academic purposes like reading lecture notes than for other purposes. On the contrary, this finding deviates from the finding of Atas and Celik (2019) in a study of mobile phone use by university students. They observed from results that undergraduates' predominant purpose of mobile phone use was for messaging and calling people, while it was less frequently used for educational purposes. The finding is also at variance with the findings of Lau, Chiu, Ho, Lo and See-To (2017) in a study on the use of mobile devices by undergraduate and postgraduate students for educational purposes. The study revealed that mobile devices are used mainly by the students for other purposes and least used by them for academic purposes.

With respect to research question one (RQ1), the study sought to find out the remotely accessed e-resources by the students. Results showed that e-books were the most remotely accessed resources

in the library, followed by e-journals. This may be because the students can find some of the expensive and bulky engineering textbooks they need in the form of e-books. This is in line with the finding of Salman, Ahmed, Raheem and Pelemo (2020) in a study on availability, accessibility, and use of electronic information resources among undergraduate students in Fountain University Library, Osogbo, which revealed that e-books and the Internet were the most accessible of the electronic information resources. Results also show that Online Public Access Catalogue was the most available online information service for students. This is a deviation from the findings of Gbotosho (2019) in a study involving undergraduates in the Faculty of Health Sciences, Osun State University, which revealed that internet services are the most available electronic services in the university's e-library. The findings of Anyim (2018) in a study of some university e-libraries in Kogi State, Nigeria, also revealed that online databases constituted a significant percentage of the libraries' digital resources.

Research question two (RQ2) aimed to determine the students' preferred device sources and formats for accessing e-resources. The Smartphone was the major device preferred for e-resources access by undergraduates and was followed by the laptop. The preference for the Smartphone may be due to its portability and handiness, which makes it more mobile than the other devices. This finding is supported by the finding of Miatato (2020), who observed in a study on the frequency and purpose of use of e-resources regarding the level of awareness of students in SardarVallabhbai Patel University of Agriculture and Technology that the Smartphone is the most used device for accessing e-resources by the students, followed by the laptop. Another study by Sebastian and Muthumari (2020) also corroborates this finding, as all the respondents, 352(100%), indicated that mobile phones are the primary devices through which they access e-resources, while an equal number of respondents, 143 (40.06%), indicated that they used laptops and tablets to access e-resources.

Results also showed that the most preferred format for accessing e-resources is PDF ( $\bar{x}$ =3.43), followed by MS Word ( $\bar{x}$ =2.79). The preference for the PDF format could be because it is easily downloadable and easy to read, as its formatting is usually retained across devices. This agrees with the finding of Tariq and Zia (2014) on the use of electronic information resources by the students of the faculty of science of the University of Karachi, where results showed that the majority of the respondents (74.35%) prefer PDF format for accessing electronic information resources. On the other hand, the finding is at variance with the finding of Aravind (2017) on the use of electronic resources in Engineering College Libraries, which showed that the majority of the respondents, 211 (97.69%), used Word and PowerPoint format for accessing e-resources. This was followed by 204 respondents (94.44%) who preferred PDF format; 174 (80.56%), who preferred Multimedia Objects format; and 68 (31.48%) who preferred HTML.

The purpose of research question three (RQ3) was to examine the degree of usefulness of e-resources used by undergraduates in the Engineering Faculty. Most of the students found e-resources moderately useful, while the least percentage found them not useful. This may be because with the rapid advancement in technology, the information needed by the students is available in electronic format in vast amounts. This is in line with the findings of Anyim (2018) in a research on students' perception of electronic resources, usefulness and enhancement strategies for effective distance learning programme, where results showed that the majority of the students found e-resources to be valuable tools for learning, acquiring current information, promoting self-learning, providing a plethora of information from a wide range of sources and also for accessing information quickly and easily. This finding also corroborates the finding of Mollel and Mwantimwa (2019) in a

study of users' acceptance of e-resources usage at the Institute of Finance Management, Tanzania, where 84.5% of the respondents indicated the usefulness of e-resources in providing current learning materials, 76.7% indicated that e-resources enhanced their effectiveness in learning and research, 75.5% indicated that e-resources were useful in finding information in their areas of specialisation and 61.1 % found e-resources useful in accomplishing daily tasks.

Research question 4 (RQ4) sought to identify the determinants of e-resources use by undergraduates. Results showed that the most determinant factor in the choice of e-resources by the undergraduates is accuracy, followed by accessibility. In contrast, the least determinant of the factors mentioned is proximity. The choice of accuracy as the most determinant factor may be because engineering students deal more with calculations and mathematical information, which require accurate results. This is at variance with a study on remote access to e-resources by Nairobi distance learning students carried out by Nyakweba (2016), where 75% of the undergraduate respondents indicated timelines as the most important factor in their choice of e-resources, 71% of the respondents indicated accessibility and 61 % indicated accuracy.

Research question five (RQ5) aimed to examine the remote access search techniques for e-resource use by the undergraduates in the Engineering Faculty. Subject searching was ranked highest by the mean score as the primary remote access search technique used by the undergraduates and was followed by Author/Title search. On the contrary, this finding is not in agreement with the finding from the study of Eke, Omekwu and Agbo (2014), in which results revealed that the most used technique for accessing information via e-resources is the use of search engines ( $\bar{x}$  =3.7), followed by keyword searching and the use of the universities database. ( $\bar{x}$  =2.59).

Research question six (RQ6) was raised to identify the training/orientation possessed to use remotely accessed information by undergraduates. Results showed that undergraduates are mostly trained about using remotely accessed information by their peers or colleagues 132(33.5%), closely followed by workshops and seminars on internet use by faculties 131(33.2%). The least avenue for the orientation of the students on how to use remotely accessed information is external training in other institutions or centres 84(21.3%). The reason that the primary source of training is through peers or colleagues may be because they are the closest and most easily accessible set of people to the undergraduates. This finding deviates from the finding of Singh and Varma (2017) in a study on the use of e-resources by students and researchers of Banaras Hindu University. Most of the student respondents, 136(51.32%), learnt how to use e-resources by themselves, followed by publisher websites 36(13.58%), and orientation programmes 34(12.83%). The finding is also at variance with the finding of Rujanaik and Naik (2017) in a study on the use of e-resources and services by users of management college libraries in Bangalore. The study revealed that 72(88%) of the students involved in the study learnt to use e-resources through tutelage by teachers or supervisors, 44(54%) through tutelage by friends or colleagues and 34(89%) through a course offered by the college.

Research question seven (RQ7) sought to identify the problems encountered by the undergraduates while using e-resources. Results showed that the problems encountered by undergraduates in the Engineering Faculty while using e-resources and services include download delay, difficulties in filtering results from a search, information overload, power outage, credibility of information challenges, difficulties in the navigation of some websites, and lastly inaccessibility of some websites. This is in line with the findings of Urhiewhu and Omah (2016). They mentioned that some of the

challenges faced by undergraduate students of Taraba State University Library in using e-resources are delay in downloading e-resources, the necessity of filtering information from search, difficulty in navigating through some e-resources, and challenges of electricity supply, amongst others. This finding also corroborates the finding of Alabi (2021), who identified slow internet speed and electricity failure as challenges undergraduates face in the use of electronic resources. Findings from other studies like Singh and Varma (2017) and Aladeniyi and Owokole (2018) also identify similar challenges in the use of e-resources by undergraduates.

## 5.2. Conclusion

The undergraduates in the study used their smartphones primarily for academic purposes, and e-books were the most remotely accessed resources in the library, followed by e-journals. Furthermore, the most preferred format for accessing e-resources by the undergraduates is PDF, and the degree of usefulness of remotely accessed e-resources by undergraduates was moderate. The choice of accuracy as the most determinant factor may be because engineering students deal more with calculations and mathematical information, which require accurate results. However, their most-used technique for accessing information via e-resources is the use of subject searching.

Nonetheless, the problems encountered by the undergraduates while using e-resources and services include download delay, difficulties in filtering results from a search, information overload, power outage, credibility of information challenges, difficulties in the navigation of some websites, and lastly, inaccessibility of some websites. Based on the findings of the study, the study concludes that remote access to electronic resources enhanced the use of electronic resources by undergraduates in the study.

## 5.3. Recommendations

Based on the findings of the study, the following recommendations are made:

- Libraries should provide the necessary software that will foster remote access to the library's vast amount of electronic resources.
- Libraries should ensure that the e-resources are configured in a generalised preferred format to enable use by the undergraduates.
- Libraries should consider accuracy as the major determinant of e-resources' use by undergraduates when providing remotely accessed e-resources.
- Libraries should train students to optimise the use of remotely accessed e-resources. They should also help them attain the technical skills to enhance their use for academic purposes.
- Libraries should ensure that the contents of e-resources meet the requirement of undergraduates in various academic disciplines.
- Libraries should promote their websites for adequate visibility among their community of users.
- Libraries should create awareness of their e-resources for optimal use from time to time.

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