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The Role of Institutional Repositories (IRs) in Supporting Teaching, Learning and Research during Covid-19 in Kenyan Universities

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Abstract

The abrupt closure of universities in 2020 because of COVID-19 forced many of them to adopt online learning through various technological platforms. Institutional repositories (IRs), digital archives of intellectual outputs of universities, could be important in online education. However, there is a dearth of empirical data on their ability to support teaching, learning and research in universities. This study aimed to investigate the role of IRs in supporting teaching, learning and research in Kenyan universities during the Covid-19 and to identify challenges faced by the universities in the usage of IRs. The study was informed by the technology acceptance model and adopted a mixed method approach and a multiple-case (embedded) research design. The study was conducted in four universities using a sample of 370 students, 322 academic staff and 12 key informants, selected by a mix of stratified, random, and purposive sampling technique respectively. The study found that IRs played crucial roles in supporting teaching, learning and research during the pandemic, with three out of every four respondents (n=424, 73%) using it for teaching, learning and research. Alarmingly, IR usage was lowest, χ^2 (4) = 73.462, p<0.0001, among the senior-most academic staff (professors, associate professors, and senior lecturers) relative to junior staff and students. Perceived lack of usefulness and difficulty of use of IRs constituted the major challenges. This study recommends the improvement of IRs perceived usefulness and perceived ease of use to enable them better support teaching, learning and research.

Keywords: Institutional repository, covid-19, teaching, learning, research
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Introduction

The novel COVID-19 pandemic has not only caused a tremendous loss of human life worldwide but has extensively been disruptive. Originating from Wuhan, China circa November 2019, it quickly became a global menace, spreading to more than 177 countries and infecting in excess of 722 435 patients by just 29th of March 2020 (World Health Organization [WHO], 2020; Sahu, 2020). In the first few months of the onset of the disease, no one knew how it spread and the impact it had on human life. The disease spread to other countries and continents including Europe, Italy

and Africa. The United Nations [UN] (2020) estimated that at the height of the pandemic, about 1.6 billion learners in more than 190 countries worldwide were out of school, representing between 94% - 99% of the world's student population. In Africa, the first case of corona virus was reported in Egypt on 14th February 2020. In Eastern and Southern Africa, 127 million school-going children were sent home at the end of March 2020. In Kenya, the government abruptly closed schools and colleges nationwide on March 15, 2020, throwing learning of nearly 17 million students in Kenya into jeopardy. Because of the need to minimize all in-person events to stymie the spread of the virus, universities in Kenya scrambled to devise alternative measures to ensure continuity of learning. Many opted to use online education through various technological platforms to ensure that their students complete their programs in good time (Magut, & Kiplagat, 2022; WHO, 2020). Online education can be viewed as the process of teaching and learning conducted using virtual platforms. Explicitly, online education can be conceptualized as electronically supported teaching and learning, which relies on the Internet for teacher-student interaction and the distribution of class materials (Kaya, et al., 2013). Other than teaching and learning, the Pandemic also profoundly disrupted academic research, with laboratories shuttered and fieldwork largely deferred (Radecki & Schonfeld, 2020). However, many universities were caught off-guard; with libraries in most institutions unprepared for online services (Gabriel & Yusuf, 2020). Libraries are mandated to provide guidance to students and faculty on access to relevant information (Dorner & Revell, 2012).

To deliver online education, it is germane to have digital content. The digital wealth of a university usually sits in an institutional repository (IR). Consequently, IRs could play crucial roles in online education and research. During Covid-19, institutions with well-developed repositories could theoretically be able to connect their users with a wealth of information for all purposes such as research and learning purposes. Since online education was implemented in nearly all universities in Kenya, it implied that electronic platforms were used to provide access to information by both faculty and students. This study defines an institutional repository as technologies that provide the means to collect, manage, provide access to, disseminate, and preserve digital materials produced at an institution (Shreeves & Cragin, 2008). Ware (2004) delineated the following criteria for IR: a Web-based database (repository) of scholarly material; the material is produced by the institution (as opposed to a subject-based repository; the material is cumulative and perpetual; it is open and interoperable that is compliant with Open Archive Initiative compliant software; and lastly, it collects, stores, and disseminates scholarly material as part of the process of scholarly communication. IRs could contain a wide array of scholarly materials including books, book chapters, dissertations, thesis, projects, conference proceedings, journals, speeches, animations, learning objects such as online texts, video lectures, and class notes, laboratory guides among other literature (Saini, 2018).

IRs could have been conceivably pertinent in education and research during Covid-19 because of various reasons. By storing in digital form academic materials, such as, theses, dissertations and research articles, IRs help to disseminate materials that would otherwise have existed only in print format and secreted in basements. The diverse content of IRs represents rich resources of scientific, technological, artistic, and cultural value, which could be crucial in fostering students' research and education (Vrana, 2011). Koutras and Bottis (2013) have described IRs as major and alternative gates of knowledge. Secondly, the current system of scholarly publishing is undergoing pressure from the dramatic increase in journal prices, explosion

in the volume of information, and the increasing cost of storing printed material (Vrana, 2011). The problem of high journal prices is especially acute in universities in developing countries that face decreased funding (Sarker *et al*., 2010). Given that students were home during the Covid-19 period, they could not access the few printed journals in their libraries. Consequently, IRs should have provided scholarly literature, completely free of charge, to both lecturers and students for education and research (Tsunoda *et al*., 2016). Thirdly, Crow (2002) argues that the current system of scholarly communication dissipates the institution's intellectual output in a myriad of journals. IRs, on the other hand, can bring together an institution's research outputs into a single interface, making it easier to encapsulate the university's academic productivity and prestige. Students and staff could, therefore, access a variety of scholarly material for education and research, at a single portal. From the foregoing, proper management of IR places them as rich sources for information utilizable for teaching, learning, and research.

Although IRs could have, potentially, played crucial roles in providing online education and scholarly materials for research during Covid-19, there are few empirical studies that have assessed how they performed during the Pandemic. The virus occasioned mass closures of institutions of higher education, as a result of the need to minimize all in-person events, opening avenues for intensification of virtual platforms in education and research. IRs are the ultimate vaults of an institution's intellectual output, rich in digital materials, such as books, book chapters, dissertations, thesis, projects, conference proceedings, journals, speeches, animations, learning objects such as online texts, video lectures, and class notes, laboratory guides (Saini, 2018; Tsunoda *et al*., 2016). Academic staff and students could, therefore, have read, downloaded, copied, or printed digital documents for education and research, when cloistered mostly at home during the Pandemic.

IRs are not merely digital caches but are tools that could revolutionize scholarly communication. After all, IRs could only be helpful in education and research if the university's academic community deposit and access scholarly material. Researchers, such as Bangani (2018), Lynch (2016), Lynch (2003) and Crow (2002) have bemoaned the fact that publishers, who are usually business people, control the process of scholarly publishing rather than academics themselves. For instance, Crow (2002) argues that although the Academy provides the bulk of direct labour involved in scholarly publishing, it also bears much of the cost through subscription fees. Faculty scholars produce the original research itself; academic peer-reviewers authenticate the quality of the research; while academic libraries process, distribute and archive the research. On the other hand, journal publishers themselves spend little or nothing. Moreover, with the evolution of digital publishing and distribution over the internet, the cost of print production and distribution has declined and yet publishers have not reduced the price of journals commensurately. IRs could create new communication models, constructed, and controlled by scholars themselves (Crow, 2002). For this to succeed, the whole scholarly community – faculty, library, administration, and students, must work seamlessly together. Few studies have explored the differential usage and perception of IRs by faculty, library staff and students during Covid-19. This paper focuses on how IRs fared in the Covid-19 epoch in supporting teaching, learning and research in Kenyan universities.

This study aimed to investigate the role of institutional repositories in supporting teaching, learning and research during the Covid-19. The study focused on the following research objectives:

(I) to assess the usage of Institutional repositories in teaching, learning and research in Kenyan Universities during Covid-19 pandemic; and (II) to identify challenges faced by universities in the usage of Institutional Repositories during Covid-19 pandemic.

Literature Review

This section reviews both theoretical and empirical literature to provide an understanding of the institutional repositories' capacities in supporting teaching, learning and research activities in universities. First, a theoretical review of the study is first presented, followed by an empirical review of related literature on potential roles of IRs in supporting teaching, learning and research activities; and factors that hinder IRs' ability to support teaching, learning and research.

Theoretical Framework

IRs are relatively novel technologies. Thus, technology adoption models could be germane in explaining the spread, adoption, use and acceptance of IRs in higher education institutions. The model adopted by the study was the technology acceptance model (TAM), one of the mainstay theoretical frameworks among information systems community (Park, 2009). This model could explain why staff and students could embrace technology and proceed to use it. The TAM, a modification of the theory of reasoned action, was first introduced by Fred Davis in 1985 (Davis, 1985; Fishbein & Ajzen, 1975). The basic TAM model theorizes that if a user perceives a technology as being useful, that is, perceived usefulness (PU) and easy to use, labelled as, perceived ease of use (PEU), they will have a favourable attitude towards it. Consequently, they will likely use it (behavioural intention), leading to actual usage (Farahat, 2012; Davis, Bogozzi, &Warshaw, 1989). The PU is defined as "an individual's perception that using an IT system will enhance job performance" whereas PEU is conceptualised as "an individual's perception that using an IT system will be free of effort" (Davis *et al*. 1989: 21). The model predicts that when the PU and PEU of a technology improves, a user's attitude towards the technology will be positive, leading them to adopt it (Figure 1).

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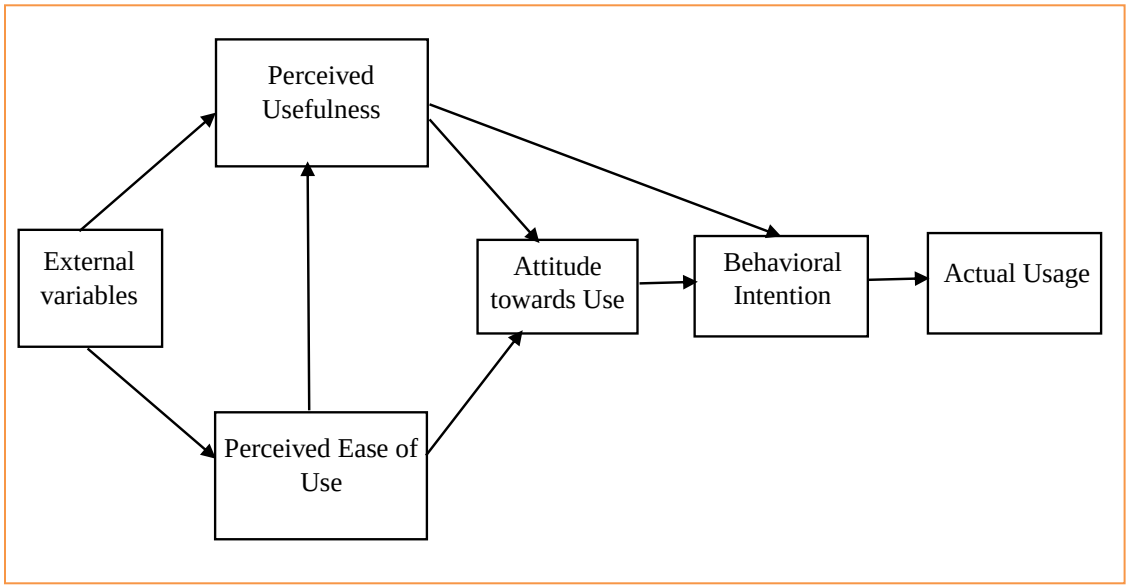

Figure 1: The basic Technology Acceptance Model (Adapted from Davis *et al*., 1989)

In addition, PEU can positively influence PU while PU can independently affect BI. Various external variables, such as system design characteristics, training, compatibility, experience, enjoyment, self-efficacy, complexity, managerial support, social influence and computing support, can affect both PU and PEU (Farahat, 2012; Lee, Kozar & Larsen, 2003). TAM is one of the most influential and frequently cited models, with authors, such as Lai (2017) and Durodolu (2016) suggesting that it has become the gold standard, if not a paradigm, in the theory of IT acceptance.

This theory could be apt for the study. It can be argued that if members of academic staff and students perceive IRs as being useful and easy to use for teaching, learning and research, they are likely to develop positive attitudes toward using them. This will likely result in actual usage. Thus, TAM could be useful basis to explain factors for non-use of IRs during Covid-19, for instance, their perceived usefulness and ease of use during the period.

Empirical Literature Review

IRs could have been potent tools in teaching, learning and research during Covid-19 pandemic. Ukwoma and Dike (2017) reported that lecturers and students can use IRs to access articles and other information resources for research and learning. For instance, IRs can supplement and increase the knowledge that scholars have in the subject area of interest. Academic staff and students can download freely published articles from the repositories and review the literature to identify gaps in knowledge or new findings. However, the study did not empirically test these conclusions. Stanton and Liew (2012), in an examination of doctoral students' awareness and attitudes in a New Zealand University found that only a small number of students used repositories and open journals in their own research, despite the existence of research services like Kiwi Research Information Service and Australasian Digital Theses. Jean et al., (2011) reported that

users hoped to find journal articles, conference papers, theses and dissertations, raw data, lectures, presentations and newsletters in IRs. The users also wanted to access course content for use in their work, access raw data for use in research projects, and identify colleagues and research students interested in collaboration. Shukla and Ahmad (2018), in a survey of scientists and researchers at Indian Council of Scientific and Industrial Research (CSIR) reported that most scholars preferred to publish their works in peer-reviewed scholarly journals rather than in IRs because of the strong peer-review mechanism of the former that ensured good quality articles. The absence of certification for materials deposited in IRs could have led to a predominance of grey literature, some of dubious quality. IRs were preferred because of their ability for long term preservation of research materials and an abundance of grey literature of all types.

The study by Shukla and Ahmad (2018) illustrates the tension between two contrasting philosophical viewpoints about the objectives of IRs: one that considers IRs as competition and possible replacement for traditional publishing (Harnard, 1995; Crow, 2002); the other that views IRs as a supplement to traditional publishing (Lynch, 2003). For example, Crow (2002) argued that IRs should take over all the traditional functions of traditional publishing, namely, registration, certification, dissemination, and archiving, hence, placing the function of scholarly publishing rightfully into the hands of the Academy. Lynch (2003), on the other hand, viewed IRs' roles as supplementary, arguing against them taking on the function of certification during scholarly publishing. The which model has or should dominate IRs is not clear.

In Africa, Bamigbola (2014) surveyed 80 faculty staff of the Federal University of Technology, Akure, Nigeria and found that although there was a positive attitude towards IRs, only 8% of them had both searched them for academic information and submitted their research to them whereas 33% had neither searched nor submitted their scholarly work to IRs. In one of the few studies carried out during Covid-19 pandemic, Kasa and Yusuf (2020) found an upsurge in dissemination of information resources (mostly links) through "Telegram", a social media platform in an academic library in a Nigerian University. However, the study looked at social media and did not investigate how IRs were used during the pandemic. In Kenya, Ratanya (2017) conducted a case study of access and use of Egerton University's institutional repository by academic staff and found that most of the respondents were not aware of the existence of the repository while those who were aware faced myriad challenges in accessing and using the repository content. Similarly, Moseti (2016) studied institutional repositories of six universities in Kenya and reported that the scholars rarely used the university's repositories to preserve their research because they were not aware of the role of the repositories in the preservation of research output.

IRs could have important challenges. For example, Van de Velde (2017) argues that disaggregated nature of IRs affords local control but creates problems of siloed content and non-uniform application of metadata standards. Arlitsch and Grant (2018) reported that few users bother to search individual IRs, preferring to use aggregators such as Google Scholar (GS). Tay (2017) suggested that many researchers choose to deposit their work in either subject repositories or preprint repositories, for instance, SSRN (Social Science Research Network), and SCNs (Scholarly Collaboration Networks) such as Academia, Research Gate and Mendeley, rather than in IRs because they lose their ability to edit their work when they leave the institution, unlike when they deposit in SCNs, where they retain lifelong control. Many researchers have reported on the

difficulty in the functionality of IRs, with uploading burdensome by having to create metadata and articles troublesome to find on the internet (Jean *et al*., 2011).

Research Gap

This review showed that many empirical studies on IRs were conducted in the pre-Covid-19 period. Few studies have explored empirically the role of IRs in teaching, learning and research during the Pandemic, despite the fact that they could have been important digital platforms for online education and research.

Methodology

This study adopted a mixed method research approach (MMR), grounded on the pragmatic philosophical paradigm and a multiple-case (embedded) research design. To assess IRs' role in supporting teaching and research during Covid-19, it was pertinent to obtain both objective information and opinions of respondents, which required quantitative and qualitative approaches, respectively. This study used four universities in Kenya (multiple-case), with well-established IRs (Webometrics, 2017): University of Nairobi (UoN), Moi University, Strathmore University and United States International University-Africa (USIU-A). The first two and the last two are public and private universities, respectively. The target population for the study comprised of 93000 students, 2463 academic staff and 12 librarians/research directors from the universities. A combination of stratified, random, and purposive sampling techniques was employed to obtain 370 students, 322 academic staff and 12 key informants from the four selected universities. The sample sizes for academic staff and students were computed according to the formula and correction for small population (where appropriate) in a cross-sectional study for estimating prevalence, as outlined in Sapra (2022). This formula was appropriate because outcomes in this study were mostly proportions, for example, using or not using IRs. The formula was predicated on a confidence level of 95%, a sampling error of 5% and a proportion of 0.5 in the attribute of interest, which assumed maximum variability in the attribute (Noordzij *et al*., 2010).

Since the target population was not homogenous, stratified sampling was used. Academic staff were stratified at two levels: university and school, with six major schools used (engineering, information sciences, education, sciences, humanities and business. Students were stratified into three levels: university, school (like those of academic staff), and the course of study (whether undergraduate or postgraduate). The relevant target population numbers for each stratum was identified. To ensure a proportionate representation of staff and students from the four universities, six schools, and course of study (for students), the sample contributed by each group was weighted according to stratum's target population. Once the number of respondents from each stratum had been determined, simple random sampling was then used to select participants from each of the strata. Random sampling ensured every student and academic staff had an equal chance of being selected (Creswell, 2014). On the other hand, purposive sampling was used to choose a university librarian, system librarian and research director from each university, because it allowed the study to sample key decision makers on issues of content management and people with expert knowledge in IR.

Semi-structured questionnaires were used to collect data from students and academic staff while university librarians, system Librarians and research directors were interviewed for an in-depth understanding of IRs working. Since the institutions had closed, the study utilised online questionnaires and interviews conducted with mobile phones. To assess usage of IRs during the Pandemic, the study asked two questions: are IRs very important in supporting teaching, learning and research during Covid-19; and did you use IRs for teaching; learning; and research during Covid-19? Data were collected between October and November 2020. This study collected both quantitative and qualitative data. Quantitative data were analysed using descriptive statistics and while relationships were tested using chi-square ($\chi 2$) cross tabulations. Qualitative data were analysed by the method of content analysis.

Results

The role of IRs in teaching, learning and research during Covid-19 pandemic

Overall, of the 370 and 322 questionnaires administered to students and members of academic staff from the four universities, 332 (89.7%) and 293 (91%), were returned, respectively. Most students (52%) and academic staff (61%) were sampled from UoN, followed by Moi University (academic staff, 25%; students, 32%), and USIU (students, 10%; academic staff, 9%). Most respondents came from public rather than private universities because of the relative populations of the parent universities (Table 1). Most students were male (62%) and undergraduates (63%), with 24% and 13% studying for masters' and PhD degrees, respectively. Conversely, slightly more female academic staff members (57%) were sampled. Most staff were senior lecturers (27%), assistant lecturers (25%) or lecturers (22%) with professors making up 9% of the sample.

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Table 1: Sample characteristics (*n* = 332 (students) and 293 (academic staff)

Bio-graphical information	Respondent type	Categories	Frequency	Percent
University	Student	Moi	107	32.2
		UoN	172	51.8
		Strathmore	19	5.7
		USIU	34	10.3
		Total	**332**	**100.0**
	Academic staff	Moi	72	24.6
		UoN	180	61.4
		Strathmore	15	5.1
		USIU	26	8.9
		Total	**293**	**100.0**
University type	Student	Public	279	84.0
		Private	53	16.0
		Total	**332**	**100.0**
	Academic staff	Public	252	86.0
		Private	41	14.0
		Total	**293**	**100.0**
Respondent's gender	Student	Male	205	61.8
		Female	127	38.2
		Total	**332**	**100.0**
	Academic staff	Male	127	43.3
		Female	166	56.7
		Total	**293**	**100.0**
Current program	Student	Undergraduate	208	62.6
		Masters	80	24.1
		PhD	44	13.3
		Total	**332**	**100**
Academic rank	Academic staff	Assistant lecturer	73	24.9
		Lecturer	64	21.8
		Senior lecturer	79	27.0
		Associate professor	51	17.4
		Professor	26	8.9
		Total	**293**	**100**

Source: Survey Data, 2020

The study asked respondents whether they used an IR in teaching, learning or research during the Covid-19 period (Figure 1).

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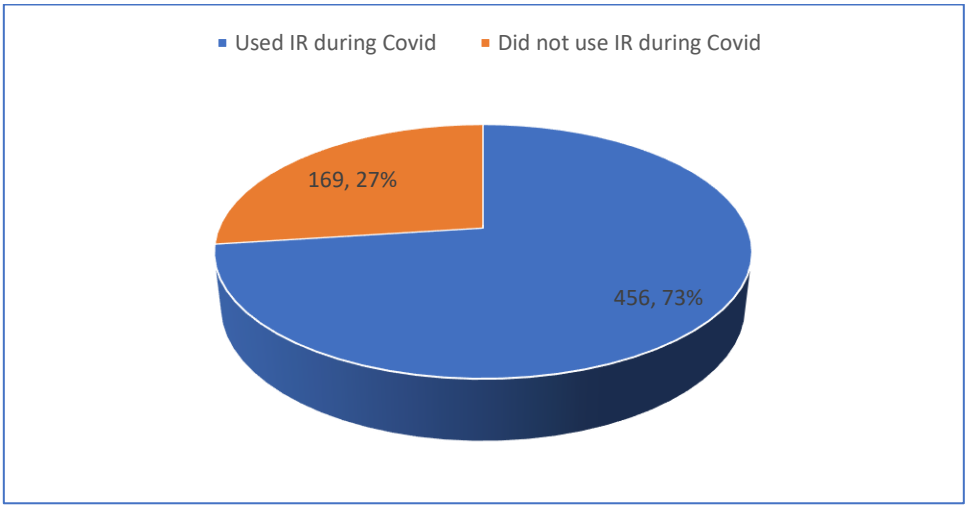

Figure 1: Use of IRs by respondents during Covid-19

Results showed that three out of every four respondents (n=456, 73%) had used IRs for either teaching, learning and research activities during Covid pandemic. Chi-square cross tabulations (Table 2) indicated that respondents' university type, χ^2 (1) = 11.717, p=.001, significantly influenced their usage of IRs, with more respondents (87%) from private universities using IRs compared to those from public universities (70%).

Table 2: Relationship between using IRs during Covid-19 and sample characteristics (n = 332 (students) and 293 (academic staff)

			Used IR for either Teaching, Learning or Research during Covid-19		
Variable category	**Respondents'**		**No**	**Yes**	**Total**
University type	Public	Frequency	159	372	531
		Percentage	29.9	70.1	100.0
	Private	Frequency	12	82	94
		Percentage	12.8	87.2	100.0
	Total	**Frequency**	**171**	**454**	**625**
		Percentage	**27.4**	**72.6**	**100.0**
Gender	**Male**	Frequency	113	219	332
		Percentage	34.0	66.0	100.0
	Female	Frequency	58	235	293
		Percentage	19.8	80.2	100.0
	Total	**Frequency**	157	422	579
		Percentage	27.1	72.9	100.0
Student's academic program	Undergraduate	Frequency	56	152	208
		Percentage	26.9	73.1	100.0
	Masters	Frequency	24	56	80
		Percentage	30.0	70.0	100.0
	PhD	Frequency	9	35	44
		Percentage	20.5	79.5	100.0
	Total	**Frequency**	89	243	332
		Percentage	26.8	73.2	100.0
Academic staff's Rank	Assistant lecturer	Frequency	1	72	73

	Percentage	1.4	97.6	100.0
Lecturer	Frequency	4	60	64
	Percentage	6.2	93.8	100.0
Senior lecturer	Frequency	34	45	79
	Percentage	43.1	56.9	100.0
Associate professor	Frequency	22	29	51
	Percentage	43.1	56.9	100.0
Professor	Frequency	17	9	26
	Percentage	65.4	34.6	100.0
Total	**Frequency**	78	215	293
	Percentage	26.6	73.4	100.0

Source: Survey Data, 2020

Female respondents (80%) used IRs during Covid-19 more frequently relative to their male companions, χ^2 (1) = 14.930, p<0.0001. Results showed that student's academic program did not significantly influence, χ^2 (2) = 1.552, p=.460, their use of IRs during the pandemic, suggesting that students used IRs similarly, regardless of whether they were undergraduates, masters, or PhD students. On the other hand, use of IRs was found to significantly, χ^2 (4) = 73.462, p<0.0001, decrease as the staff's academic rank rose. Professors seldom used IRs (35%), followed by senior lecturers (57%) and associate professors (57%). However, use of IRs was highest in assistant lecturers (98%) and lecturers (94%).

Figure 2 shows results when respondents were asked on whether IRs were important in supporting teaching, learning and research in universities during Covid-19.

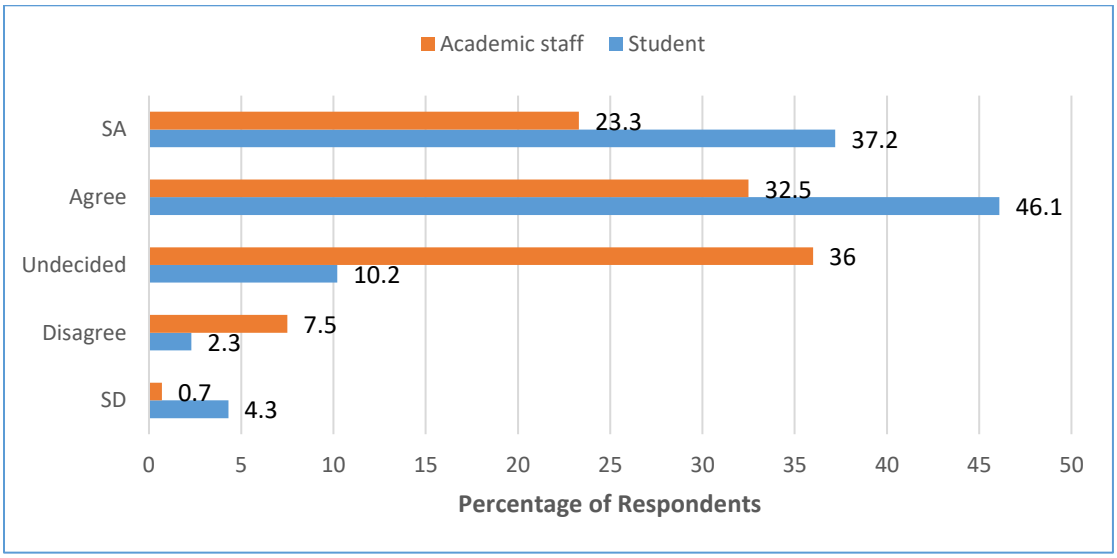

Figure 2: Comparison of students and staff on the importance of IR during Covid-19
SA=strongly agree, SD=strongly disagree.

Source: Survey Data, 2020

While eight in every ten students (46% agreed while 37% strongly agreed) thought that IRs were very pertinent in supporting teaching, learning and research during Covid-19, only five in every ten members of staff (33 % agreed while 23% strongly agreed) thought so. The differences were

found to be significant, χ^2 (4) = 75.684, p<0.0001), showing more students were likely to see IRs as being important in learning and research but only half of the academic staff were likely to think so. In addition, a significant proportion of lecturers (36%) could not make up their mind as to whether IRs were important for teaching, learning, and research.

On the other hand, all the university librarians, system librarians, and research directors interviewed in the study thought that IRs were important in teaching, learning, and research during Covid-19. Typically, their answers on the importance of IRs included the following:

> *Institutional repository is extremely important because it exposes staff researchers with students' theses and dissertations to a wider international audience, hence provide opportunities to research collaborations* (System librarian, UoN).

> *Yes, they aid in teaching, learning and research by bringing the information online and making it more accessible* (University librarian, MU).

Chi-square cross tabulations (Table 3) showed that more respondents, χ^2 (4) = 25.788, p<0.0001), from private universities (89%) either agreed or strongly agreed that IRs were very important in teaching, learning and research during Covid-19 compared to those from public universities (66%).

Table 3: Relationship between importance of IRs during Covid-19 and sample characteristics (n = 332 (students) and 293 (academic staff)

			IRs are very important in Teaching, Learning & Research during Covid-19					
Variable			*SD*	*D*	*N*	*A*	*SA*	Total
University type	Public	*F*	13	31	136	193	158	531
		%	2.5	5.8	25.6	36.3	29.8	100.0
	Private	*F*	3	0	7	55	29	94
		%	3.2	0.0	7.4	58.5	30.9	100.0
	Total	***F***	**16**	**31**	**143**	**248**	**187**	**625**
		%	**2.6**	**5.0**	**23.0**	**39.7**	**29.9**	**100.0**
Student's academic program	**Undergrad.**	*F*	9	5	20	102	72	208
		%	4.3	2.4	9.6	49.1	34.6	100.0
	Masters	*F*	0	3	8	30	39	80
		%	0.0	3.7	10.0	37.5	48.8	100.0
	PhD	*F*	0	0	6	23	15	44
		%	0.0	0.0	13.6	52.3	34.1	100.0
	Total	***F***	**9**	**8**	**34**	**155**	**126**	**332**
		%	**2.7**	**2.4**	**10.2**	**46.7**	**38.0**	**100.0**
Academic staff's Rank	**Assistant lecturer**	*F*	2	0	13	33	25	73
		%	2.7	0.0	17.8	45.2	34.2	100.0
	Lecturer	*F*	0	0	11	36	17	64
		%	0.0	0.0	17.2	56.3	26.5	100.0
	Senior lecturer	*F*	0	0	54	12	13	79
		%	0.0	0.0	68.4	15.2	16.5	100.0
	Associate professor	*F*	0	22	10	6	13	51
		%	0.0	43.1	19.6	11.8	25.5	100.0
	Professor	*F*	0	0	17	8	1	26
		%	0.0	0.0	65.4	30.8	3.8	100.0
	Total	***F***	**2**	**22**	**105**	**95**	**69**	**293**
		%	**0.7**	**7.5**	**35.8**	**32.4**	**23.6**	**100.0**

Key: SD=Strongly disagree; D=Disagree; N=Neutral; A=Agree; SA=Strongly agree; F=Frequency.
Source: Survey data, 2020

The student's academic program did not significantly influence, χ^2 (8) = 12.767, p=0.120, their perception of the importance of IRs in Covid-19, suggesting that students thought IRs are very important in education and research, regardless of whether they were undergraduates, masters, or PhD students. More associate professors, χ^2 (16) = 194.969, $p<0.0001$) thought IRs were not important in teaching, learning and research (43%) whereas a majority of professors and senior lecturers were likely to be undecided (65% and 68%, respectively). On the other hand, lecturers and assistant lecturers felt that IRs were very important in teaching, learning and research (83% and 79% answered agreed and strongly agreed, respectively).

Table 4 presents results on whether respondents specifically used IRs in teaching, learning and research activities during Covid-19.

Table 4 Use of IRs in teaching, learning and research during Covid-19 (n = 332 (students) and 293 (academic staff)

Uses	Respondent type	SD		Disagree		Undecided		Agree		SA	
		Fq	%	Fq	%	Fq	%	Fq	%	Fq	%
Use IR for teaching	Academic staff	9	3.1	80	27.3	79	26.9	57	19.5	68	23.2
Use IR for research	Student	8	2.4	3	0.9	24	7.3	88	26.5	209	62.9
	Academic staff	8	2.6	31	10.6	96	32.8	40	13.7	118	40.3
Use IR for learning	Student	5	1.6	2	0.7	24	7.2	82	24.7	219	65.8
	Academic staff	54	18.4	48	16.4	54	18.4	51	17.4	86	29.4

Key: S. D=strongly disagree, S. A=strongly agree, Fq=frequency. **Source:** Survey data, 2020

Less than half of the members of the academic staff used IRs for teaching (43% agreed or strongly agreed), again with a substantial proportion of them (27%) unable to make up their minds. Nine in every ten students (89% answered agree or strongly agree) used IRs for research while only five in every ten academic staff (54% agreed or strongly agreed) did so. Again, many staff (33%) were unsure. Most students used IRs for learning (91% agreed or strongly agreed) relative to only 47% (answered agreed or strongly agreed) of academic staff who did.

Challenges faced by universities in Using Institutional Repositories during Covid-19

Results showed that the major barriers to the ability of IRs to support teaching, learning, and research were poor quality and quantity of the collection in IRs, lack of awareness about IRs, and ignorance in using IRs, especially in deposition of content. A sample of the responses follows:

> *There are no adequate materials in IR for research. The materials are outdated. The materials are so poor* (Student, UoN).

> *I do not use IR because of fear of wasting time and because of inadequate resources present in them* (Student, MU).
>
> *Inadequate and ineffective collections in institutional repositories make it difficult to find content you are searching for* (Member of academic staff, MU).

Inadequate content in IRs arose from poor deposition of the scholarly content in them. According to respondents, these could arise from:

> *Insecurities in institutional repositories, there is the issue of intellectual property rights. Fear of plagiarism* (Member of academic staff, USIU).
>
> *There are too many steps needed in deposition of any IRs materials…hence difficulty in content recruitment* (Student, Strathmore)

Respondents also cited inadequacies in IR software and poor organization of materials within IRs. A sample of their comments are as follows:

> *The IR suffers from a lack of experts and poor software's*. *The software in IR is not user friendly. The institutional repository has a complex website where the IR materials are put* (Member of academic staff, UoN).

Other reasons that limited the use of IRs included difficulty and time-consuming efforts to locate the correct material, lack of offline capacity by IRs and a simple lack of interest by both staff and students.

Discussion

Results showed that three out of every four respondents used IRs for either teaching, learning and research activities during Covid-19.time. This is significant because it suggests that given appropriate incentives (such as adequate and well-structured content in IRs) the academic community is willing to visit and use content in IRs even when away from the university, for instance, during the Covid-19 pandemic. This is in concert with Ukwoma and Dike (2017)'s finding that lecturers and students can use IRs to access articles and other information resources for research and learning.

More respondents from private universities used IRs compared to those from public universities, suggesting that they could be more acceptable in the former institutions and thus, more intensive promotion campaigns should be implemented in the latter. Promotion of IRs should also be directed towards male academicians who were more sceptical about using IRs. Students, regardless of their academic program, used IRs more than the senior academic staff (professors, associate professors and senior lecturers). This could be debilitating for IRs to effectively support teaching, learning and research if the *crème de la crème* of the universities does not use them. Kim (2010) found that younger faculty deposit more because of familiarity with technology compared with older faculty.

Similar findings were obtained when respondents were asked on the importance of IRs in supporting teaching, learning and research. While eight in every ten students thought

that IRs were very pertinent, only five in every ten members of staff thought so. In addition, a significant proportion of academic staff could not make up their minds as to whether IRs were important for teaching, learning, and research. Academic staff members such as lecturers are very important in the education process; facilitating learning by providing consciously designed pre-structured knowledge or specific influences, to bring about permanent behaviour changes in learners (Sequeira, 2012). Academic staffs also spearhead research in the universities, carrying out their own research, collaborating with other researchers and guiding post-graduate research activities (Koutras & Bottis, 2013). Consequently, the study showed that whereas most students, university librarians, system librarians, and research directors were very receptive to the use of IRs in teaching, learning and research during Covid-19, members of the academic staff, especially, the senior ones, appeared to be the Achilles heel of IRs.

The study found that the major challenges that hindered the ability of IRs to support teaching, learning and research during Covid-19 were poor quality and quantity of the collection in IRs, lack of awareness about IRs, and ignorance in using IRs, especially in deposition of content. Other reasons included inadequacies in IR software, poor organization of materials within IRs, plagiarized content, restricted material, and grey literature in IRs. Many of these weaknesses have been cited by other studies such as Salo (2008), Tay (2017), Jean et al. (2011) and Bamigbola (2014). These challenges are likely to plague IRs even in the post-Covid-19 era. The presence of few articles and of poor quality in IRs is unlikely to make repositories to be credible new communication models, that could replace traditional publishing. This could partially explain why the senior cadres of the academic community rarely used them.

The TAM could explain why some respondents used IRs whereas others did not. This paper argues that respondents who did not use IRs (for instance, the academic staff) did so because of two reasons: they perceived IRs as not being useful and not easy to use. Poor quality and quantity of materials, plagiarized content, abundance of grey literature, lack of willingness to share content, insecurities in IRs, out-of- date content, inconsistent updating of materials, and lack of interest from students and academic staff, all contributed to a perceived lack of usefulness of IRs. On the other hand, ignorance in using IRs, poor organization of content in IRs, inadequacies in IR software, difficulty in finding the required content, and lack of offline content all resulted in a lack of perceived ease of use.

Consequently, to improve IRs to better support teaching, learning and research, then, their perceived usefulness and perceived ease of use must be improved. This way, the attitudes of students and academic staff will improve, leading to an increase in their behavioural intention and therefore usage of IRs.

Conclusion

This study investigated the role of IRs in supporting teaching, learning and research during the Covid-19 in four selected universities in Kenya. The study found that IRs played a crucial role during Covid-19, with roughly three quarters of the respondents using them for teaching, learning or research when universities were forced to close. This is one of a few studies that has directly reported on the role IRs played during Covid-19. Students, regardless of their

academic program, used IRs more than the senior academic staff (professors, associate professors and senior lecturers). While nearly every student thought that IRs were very pertinent, only about a half of the academic staff thought so. This finding showed that for IRs to be credible communication model, these groups of the academic community must be fully on board.

The challenges this study found could be divided into the dual elements of the TAM: perceived lack of usefulness of IRs (poor quality and quantity of materials, plagiarized content, abundance of grey literature, land out-of- date content) and perceived difficulty of use of IRs (poor organization of content in IRs, inadequacies in IR software, difficulty in finding the required content, and lack of offline content). Thus, the TAM could explain the findings of the study.

Implication

The study found that IRs was used substantially during Covid-19, implying the immense potential IRs could play, especially in supporting online education and research. This is because IRs are digital archives and users mostly interface with them, even in college, via online platforms. A major weakness with the current IR model was that people supposed to spearhead teaching and research – professors, associate professors, and senior lecturers were the ones who seldom used the repositories. If IRs are to become satisfactory communication models that can compete with traditional publishing, this essential group must be actively involved. Findings from this study have a theoretical implication because the TAM theory could be used to explain why students and staff may or may not opt to use IRs in education and research.

Recommendations, limitations and future studies

The study recommends that university administration, librarians and faculty management should aggressively promote and market the benefits of IRs. The utility and appeal of IRs should be improved by university librarians and system librarians above those of traditional journals and subject repositories to make them useful in teaching, learning and research. This study also recommends that universities could develop their own IR Applications, which could be downloaded by members of the academic community, informing them of when and which new content has been uploaded in the IRs. This way perceived ease of use could improve.

This usefulness study investigated four cases of selected universities in Kenya. Other investigators can replicate the study in other universities to determine whether the results from this study apply. This study found more female students and private universities using IRs. Studies could be conducted to determine the provenance of these gender- and university-based differences.

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