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The story so far-digital preservation in institutional repositories: The case of academic libraries in Ghana

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The story so far-digital preservation in institutional repositories

The case of academic libraries in Ghana

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Abstract

Purpose – The purpose of this study is to examine the standards, strategies, support and challenges of digital preservation in institutional repositories in academic libraries in Ghana.

Design/methodology/approach – The research was qualitative. Data used for analysis were drawn from interviews with respondents selected purposively from eight Ghanaian academic libraries.

Findings – A key finding of the study was that although the academic libraries had operational directions for digital preservation activities in the institutional repositories, available standards and practices for ensuring long-term preservation seem to be unsuitable.

Research limitations/implications – Recommendations based on findings included development of comprehensive digital preservation policies to provide mandate and direction to preservation of the libraries digital collections, development of disaster plans, adequate funding, staff development and support from management.

Originality/value – The study has demonstrated the need for academic libraries in Ghana to have and develop good digital preservation standards for sustaining the institutional repositories to help in realizing its benefits.

Keywords Institutional repositories, Universities, Digital preservation, Academic libraries, Ghana, Educational systems

Paper type Research paper

Introduction/background

Over the past 20 years, significant efforts have been made to provide open access to research publications, and more recently to research data. The emergence of digital technologies has however brought with it new technological innovations in the information environment, leading to an alteration in the creation, accessing and distribution of scholarship. Indeed, with the advances of technology, an increasing number of higher education institutions are implementing various strategies aimed at helping the institutions to develop coherent and coordinated approaches to capture, identify, store and retrieve intellectual assets such as datasets, course material and research papers (Mosefi, 2016). Academic libraries and the library profession have not been left out the drive to deploy such innovations that mirror an organizations intellectual production, and provide access to scholarly materials in a faster and easier way. Essentially, with the emergence of digitization and the open access movement, academic libraries have transformed into digital variants leading to the establishment and growth of institutional repositories (IRs).



IRs have become one of the fastest growing elements of the digital academic library system. This, Rafiq and Ameen, (2013) explained is because of the potential of IRs to reform the current system of scholarly communication and their role in advancing the open access movement. Consequently, since the early 2000s, institutional repositories have become a common norm in many academic libraries, especially in research universities who have invested human and technical resources to build a robust technical infrastructure that will foster access to the intellectual, cultural, and administrative output of their institutions, with the anticipation to gain enhanced access to faculty research and increased visibility of research generated within the university (Li and Banach, 2011; Pérez *et al.*, 2016).

Institutional repositories are mainly described as the aggregation of scholarship reflecting the range and scope of intellectual output generated by a community of scholars affiliated with any single academic institution (Brown and Abbas, 2010). Essentially, an institutional repository is a recognition that the intellectual life and scholarship of an academic institution will increasingly be represented, documented, and shared in digital form, and that a primary responsibility of the academic institution is to exercise stewardship over these riches: both to make them available and to preserve them (Lynch, 2003). The main function of an IR is, therefore, to ensure long-term preservation and availability of digital materials (Anenene and Oyewole, 2017). Undeniably, one measure of the success of an IR is its ability to provide long term access to its holdings. To this end, an IR should clearly state its intention of a comprehensive preservation strategy for its content.

However, a major challenge to the success of every instructional repository for especially developing and emerging economies in achieving their obligations is the ability to preserve the content in the repository to provide long term access to its patrons (Emmanuel Baro *et al.*, 2013; Mensah, 2015). Swanepoel (2013) attest that issues of long term preservation of IRs have actually tops the list of hurdles in their development and maintenance. A number of researchers (Hockx-Yu, 2006; Juan, 2012; Mapulanga, 2013; Lagzian *et al.*, 2015) have however cautioned that when not addressed, difficulties of long term preservation will in future erode the credibility and goals of IRs. Unfortunately, the longevity of digital objects are usually taken for granted by many institutions, and are often perceived as a less significant task (Baro, 2010; Wiler, 2015; Moulaison Sandy and Corrado, 2018). As such, issues of digital preservation are usually not accorded much consideration and support in IRs. Indeed, the focus of many IR activities in most academic libraries have concentrated on creating repositories, depositing content, promoting discovery and access and/or encouraging the necessary cultural change but not on how to preserve the content for long term accessibility (Francke *et al.*, 2017). Consequently, although the need to have long term access to information in the IRs is understood, digital preservation management practices are not considered as priority areas and invariably ignored (Li and Banach, 2011; Amollo, 2011). However, posting intellectual assets into institutional repositories requires that all are able to trust the ability of the repository to secure the information over the long term. As such, this study aims to find out digital preservation practices observed in the IRs in academic libraries in Ghana.

Literature review

Implications/challenges of digital preservation in institutional repositories

In describing the function and mission of institutional repositories, several authors (Hockx-Yu, 2006; Cho, 2014; Stevenson and Zhang, 2015; Novak and Day, 2018) draw on definitions made by Lynch (2003) which portrays institutional repositories as “a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. Inferably, Lynch

suggests that long-term preservation is a key function for the repository, along with access and distribution. Like Lynch (2003), a number of authors (Shreeves and Cragin, 2008; Li and Banach, 2011; Vrana, 2011) note that a key objective of IRs is to provide long term preservation of digital materials in addition to access and distribution. Indeed, the notions of accessibility and integrity of digital information are central to the process of digital preservation (Ezeani and Ezema, 2011).

Nevertheless, digital preservation has not been embedded as an integral part of IRs workflow and there is neither much experience nor commonly agreed best practice as to how digital preservation is best performed. Francke *et al.* (2017) however argued that effective digital preservation measures are very essential to the survival of an IR, because it maintains the ability to display, retrieve and use digital collections in the face of rapidly changing technological and organizational infrastructures and elements. Bhat (2018) opined, that, unlike traditional information sources such as books, photos and sculptures which can easily survive for years, decades or even centuries, digital items such as content in IRs are fragile and require good preservation practices to ensure that, data generated today, can survive the changes of technology, and accessible in the future. In concurrence with Bhat (2018); Tripathi (2018) submits that in the digital age, preserving information has become a more complex task because digital information is fragile and faces many threats including technological obsolescence and the deterioration of digital storage media.

However, Li and Banach (2011) advised that, the focus of digital preservation must shift away from the need to take immediate action to rescue threatened materials, and instead moved towards the realization that perpetuating digital materials over the long-term involves the observance of careful digital asset management practices diffused throughout the information life cycle. The term “digital preservation” is used to refer to the overall approach to preserving information and records created using computers, including electronic records (Adu and Ngulube, 2017). It involves a set of processes and activities that ensures long-term, sustained storage of, access to, and interpretation of digital information (Conway, 2010). The aim of digital preservation is to keep valuable and useful digital material available for future generations of scholars, researchers and other users (Ross, 2012).

To understand the process necessary to achieve the long-term digital preservation of objects placed within a repository, Wheatley (2004) presented the following requirements:

- data are maintained in the repository without being damaged, lost or maliciously altered;
- data can be found, extracted and served to a user;
- data can be interpreted and understood by the user; and
- the achievement of goals 1, 2, 3 in the long term.

According to Wheatley (2004), the first goal is a fundamental requirement that must be addressed by any digital repository. The second goal means that repositories need to support searching and retrieval to improve access to information. This is an area which has received much attention in the past few years and has been greatly facilitated by standards, such as the Open Archive Initiative Protocol for Metadata Harvesting (OAI-PMH), allowing service providers to create discovery services across repositories by recurrent metadata harvesting. The third and fourth goals are what digital preservation needs to achieve. It is not enough just to keep the original bit-stream that represents the information stored in a digital object.

The challenge for digital preservation is not just the volume of data, but the hardware and software used to store and access digital information which are constantly upgraded and superseded (Evens and Hauttekeete, 2011). Perhaps an even greater threat than the deterioration of storage media is technological obsolescence. The rate of change in computing technologies is such that information can be rendered inaccessible within a decade (Moulaison Sandy and Corrado, 2018). The speed of changes in technology means that the timeframe during which preservation action must be taken is very much shorter than for paper. For instance, in Africa, there have been great strides in the implementation of technology initiatives including the management of digital records (Katu and Ngoepe, 2015; Ngoepe, 2015).

However, there are still significant challenges in addressing long term preservation of digital information, as a result of the global challenges of the rapid changes in technology leading to both hardware and software obsolescence (Duranti, 2005). Thus, the challenge Hockx-Yu (2006) noted is to make sure that users can access the content that has been created. Other issues and challenges relating to digital preservation in IRs identified in the literature include a lack of development and practical implementations of preservation standards such as policies, lack of technical knowledge on digital preservation in general, little preservation metadata, lack of sustainability of in terms of funding skilled staffing, and support from management (Evens and Hauttekeete, 2011; Novak and Day, 2018; Shukla and Ahmad, 2018 etc.). For instance, in 2011, Corleley, in his paper on the Ghanaian experience of institutional repositories for open access, submitted, that, academic libraries in Ghana generally did not have a clearly defined policy governing the operations of established IRs. This according to Corleley (2011) greatly affected the operations of the IRs, making it difficult to get full and committed support from their authorities. The author therefore advised, institutions that seek to set up repositories to begin their preparations by drafting a comprehensive policy that will cover the operations of the repository.

From the above discussions on implications and challenges of digital preservation in IRs, an assessment of current practices in Ghanaian academic libraries is needed.

Contextual setting: This study is conducted in Ghana, a nation in the sub region of West Africa. Ghana's education system is divided in three parts, namely, basic education, secondary cycle and tertiary education.

This study is focused on libraries within the tertiary educational institutions, designated as Academic libraries (ALs). These constitute libraries of universities and polytechnics. Academic Libraries in Ghana have gone through developmental changes in their pursuit to perform their functions. One of such is the automation and digitization of academic libraries information services delivery system of acquiring, processing, preserving, and organizing information resources. Digitization activities, including participating in collaborative digitization projects and creating digital collections began in academic libraries in Ghana in the late 2000s (Mensah, 2015). Generally, digitization activities in academic libraries in Ghana, resulted in the establishment of IRs which were coordinated or administered through the library. Although some materials deposited into the IRs and made available to patrons were digitized in-house, most of them were usually born digital. In particular, institutional repositories in academic libraries in Ghana are committed to archiving and preserving these materials for perpetual access.

Research objectives

- find out what preservation policies exist in the IRs;
- examine current preservation strategies implemented in the IRs;

- assess the level of management support for the IRs;
- find out the challenges facing digital preservation of content in the IRs; and
- to make recommendations based on findings.

Methodology

The study was qualitative. Eight academic libraries who fall among the top ten university ranking in Ghana ([Ranking of Universities in Ghana, 2018](#)) and who have established IRs at the time when this study was conducted in January, 2018 were selected as cases for the study. These comprised of five public universities and three private universities spread across the regions in Ghana.

The population for the study comprised of 8 respondents purposively drawn from eight (8) academic libraries in Ghana. These comprised of the heads of the various IRs of the academic libraries within the universities, because of their remit in the IRs, and the anticipation that they were in the best position to provide the required information to answer the study's objectives. The whole population of eight was also regarded in this study as the sample size. As such, no sampling techniques were used. For the sake of anonymity and confidentiality, the institutions from where interviewees were drawn, are not mentioned but denoted with the letters of the alphabet, such as QQ, RR, XX, YY and ZZ for the public universities, whilst the private universities are represented as AA, BB and DD. Data used for analysis were obtained using face-to-face and telephone interviews (See [Appendix](#)). Permissions were obtained from the Heads of the academic libraries before the conduct of the study. Respondents were also informed about the purpose of the study and notified that participation was voluntary.

Findings and discussions

The findings of this study are expected to point out various measures that can be adopted to strengthen digital preservation as a critical component in scaling up institutional repositories in Ghanaian academic libraries. The study will also provide an insight into the importance of digital preservation in general, and as a result assist management of IRs to plan and make decisions concerning preservation of their IRs. Furthermore, it is intended to draw the attention of policy makers' in the universities within which the libraries are situated to the importance of digital preservation and to consider long term preservation as a pre-requisite in achieving IRs objectives. Data obtained from interviews have been analyzed using qualitative approaches. Where necessary, tables, line graphs and histograms have been used to document and support the interpretation of data obtained. The researchers present and discuss the findings under the following themes:

- digital preservation policies in the IRs;
- preservation strategies implemented in the IRs;
- management support for the IRs; and
- challenges facing digital preservation of content in the IRs.

Digital preservation policies for the institutional repositories

Best practice in the management and sustainability of all forms of preservation issues requires the provision of adequate evidence compliance with the regulatory environment which usually includes statutes and mandatory standard practice.

According to [da Silva and Manuel Borges \(2017\)](#) developing preservation policies ought to be the first step toward guaranteeing preservation actions. Thus, an institutional repository should clearly state its intention of preservation by means of an explicit published digital preservation policy, to aid as an official charter for performing digital preservation functions. As such, it was essential to find out what policies have been developed to guide the implementation of digital preservation for IR content in the academic libraries.

Responses from questions asked on the availability of a digital preservation is suggestive that although [Corleley's \(2011\)](#) advice of the essential need for an IR policy is fairly taken into consideration by academic libraries in Ghana, the absence of IR policies still remain a problem in IRs in Ghana. In fact, apart from the non-existence of a general IR policy, none of the academic libraries had separate policies or any other policy on long term access to the content in the IRs. This was well captured in one of the responses from the respondents from XX Library when he said:

[...] Yes we have a policy but it is part of the overall policy for the entire preservation issues in the library. In fact, as head of this IR, I will be more than glad if there is a robust and well written policy on the creation, use and preservation of all the information received, created, used and maintained in this unit alone.

This was complemented by another respondent from DD library when he made the following comments:

[...] we don't have a comprehensive policy or guidelines for digital preservation matters, and we are actually not using the one that we have in the library's general policy. So when it comes to creation, use and storage of the content of the IR we just do what I will call a try and error sort of system.

It is interesting to mention that two of the interviewees, from AA and DD were not even sure whether the IRs had a digital preservation or not. The respondent from AA for instant said:

[...] hmmm, do we even have one? My sister I don't even know whether we have any ooo, because all I do here as the head of the IR, is from my head.

The interviewee from DD also declared:

[...] well I know the library has policies on collection development, accessibility and use of the library at large, but for a digital preservation policy, and especially one for this unit, no am not sure, but if there is, then i haven't come across it yet.

The findings based on responses from interviewees showed that although some efforts have been made, not much increase seems to have taken place in digital preservation policy development since the 2015 study by [Mensah \(2015\)](#). This findings is in concurrence with studies which have found out that most libraries have developed comprehensive policies but do not have comprehensive separate preservation policies to serve as guidelines for ensuring continues access of documents in the IRs either than those which were part of the general library policy ([Li and Banach, 2011](#); [da Silva and Manuel Borges, 2017](#)).

Preservation strategies implemented in the institutional repositories

The objective of establishing an IR is to ensure the longevity and continuous access to scholarship of value. However, to ensure the longevity of IR content, there is the need to implement plans that required the provision of conducive storage environment and measures to mitigate the effect of disasters in case they occur. Hence, this section of interviews was geared towards strategies used to preserve IR content. First of all, in relation

to availability of storage and backup facilities, all eight (100 per cent) reported that their IR content were at least backed up and stored in a secure storage systems. The respondents also mentioned other digital preservation strategies such as migration eight (100 per cent), emulation seven (88 per cent) and refreshing five (63 per cent) of the IR content in case of detection of any form of medium deterioration. However, responses to questions when asked if there were any disaster management plans for protecting digitized content in case of any disaster were similar to responses provided on the availability of a policy. None of the IRs had any written disaster plans for protecting content in the in case of any disaster. The head of the IR at YY Library made the following comments:

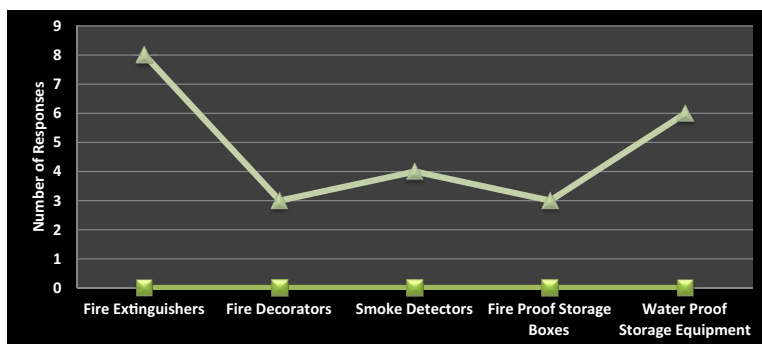
[. . .] we don't have any plan to fall on in case of any sudden occurrence leading to disasters. Am afraid, but if care is not taken may not be able to access our content in case of any disaster. Even now, the backups we have are not very durable devices so sometimes it becomes very difficult have access to the information served on them when required.

Another respondent from the ZZ library exclaimed:

[. . .] Disaster plan? No we don't have one; even the whole library doesn't have one, none that I am aware of. How much more a unit in the library. We don't have any. And am afraid that in future if anything should happen we might lose everything and go to point zero.

Further, still on the issue of a disaster plan, a follow up question was posed to find out whether there was any equipment or measures in place to mitigate disasters in case they occur. From the responses, it was encouraging, that, even though the academic libraries did not have written information disaster plans, in practice there were some measures in place to protect the content in the IRs in case of disasters. Equipment mentioned by the respondents as measures to mitigate disasters have been represented in Figure 1. As shown in Figure 1, all interviewees mentioned fire extinguishers, 38 per cent each indicated fire decorators and Fire proof storage boxes, 50 per cent said smoke detectors, whilst 75 per cent stated water proof storage equipment.

Probing further, the researchers went on to find out the rate at which the IRs content can be recovered in case of any disaster, respondents were asked to indicate how soon they think the IRs can fully retrieve the content in the IRs in case of any system failure or catastrophic



Note: $N = 8$

Source: Field data, 2018

Figure 1.
Equipment for
mitigating potential
disasters in IRs

DLP

natural or man-made occurrences. One (13 per cent), two (25 per cent), three (38 per cent) and two (25 per cent) of the respondents indicated four weeks, seven days, 48 h and 24 h, respectively. The maximum times provided by the respondents have being captured in [Figure 2](#). The responses however show that on the average, content in the IRs may not be retrieved on time in the case of any form of disaster.

Finally, on the issue of preservation strategies, respondent were asked to indicate the probability at which contemporary digital documents in the IRS will still be available and usable in the future. In reacting to this question the respondent from ZZ lamented:

[...] well if all the proper measures like the disaster management plan and policy on digital preservation of the IRs content are in place, with all the necessary human capacity, then I can assure you that there is a future for the IR, If not then am afraid we are going nowhere.

Similar sentiments were shared by the respondents from BB:

[...] the document will still be available in future, after all that is the reason for the IRS. But management must give us their full support to be able to achieve this. If they don't am afraid things will not go as we expected.

The respondent from QQ also said:

[...] Oh, the content of the IRs will still be available, but we need to have all the appropriate resources to keep it running.

Comments from the respondents from the RR library were also not far from those in the other libraries;

[...] well my prayer is for us to be able to always make the IRs usable even in the next 500 years, but the IRs is managed and maintained by staff and I believe that to accomplish this aim we need dedicated staff who eat and drink IRs to make this happen, as well as managers who understand the importance and role IRs plays in academia.

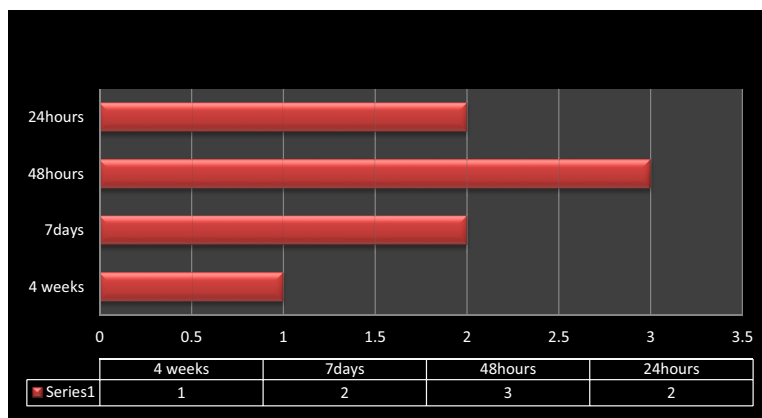


Figure 2.

Maximum content recovery time

Note: $N = 8$

Source: Field data 2018

Management support

Questions in this section were geared towards finding out whether there were dedicated budget, staff with the requisite skills and knowledge IRs, and if staff were consulted on issues concerning the IRs. Firstly, on the issue of whether the IRs had dedicated budgets, almost all of IRs 7(88 per cent) indicated the existence of a budget which appeared to be sustainable. However, responses from the interviewees suggested that these budgets were factored into the overall budget for the administration and management of the entire library, which the respondents indicated were not always enough for the management of the IR units. It is interesting to note that, comments to this question were split right down the middle; whilst 50 per cent of the respondents indicated that budget for the IR was always made available to the unit, 50 per cent also gave contrary response by indicating that their funding situation is uncertain. This is not surprising, because, in developing countries, the cost of technological and communication infrastructure far exceeds budgets allocated for library and information systems (Madhusudhan, 2010). For instance, respondents from BB indicated:

[. . .] the budget the management of the IR is part of the budget for the entire library administration, but it is a constant and committed budget, which the library ensures is used for the upkeep of the IR.

The head from the XX library also said:

[. . .] We do have a budget which is always part of the overall budget for our library, but although it sometimes delays we get what we requested in the budget submitted to make sure the IR is on course.

Conversely, a respondent from the ZZ library lamented:

[. . .] Yes I am always asked to provide a budget for what is needed to run the unit, but at the end of the day either we get half or sometimes nothing at all.

Similar sentiments were shared by the respondents from QQ library:

[. . .] the university librarian at the beginning of every year will ask me to bring the budget for the department. But sometimes is either we get what was required in the budget the following year or we don't get them at all.

The respondent from DD also said:

[. . .] it is a challenge to have access to funds to be able to get some of the things needed for the IRs especially for preservation of its content. In fact, the lack of financial support for IRs activities is manifested in the inadequate facilities for digital preservation.

The respondent from QQ library also pointed out:

[. . .] Yes we have a budget, but because it is factored into that of the library, the facilities which are needed in the IR department have to compete with the needs of the entire library, and this does not allow for peculiar needs of the unit to be met.

Moseti (2016) in their review of the challenges and opportunities of long term preservation of IRs advised institutions deciding to establish IRs to ensure, that, they have the required staff with the requisite skills and knowledge to manage issues relating to digital preservation as well as the required equipment in place. Accordingly, the next question asked was to find out if the IRs had adequate staff. Comments from respondents about this question, further emphasizes the fact that adequate staffing levels is still a concern for the IRs in academic libraries in Ghana. Responses from the interviewees have been represented in [Table I](#).

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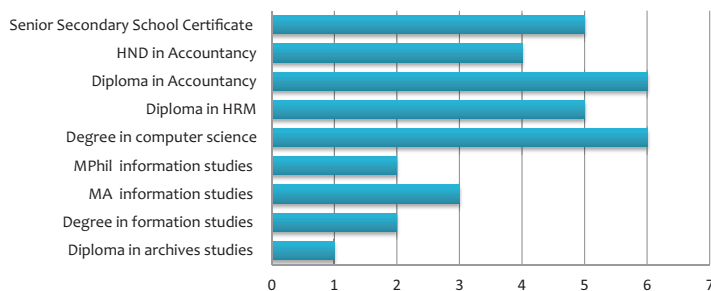
Respondents	Reponses
XX	... this unit does not have qualified personnel; I think the unit needs personnel who have educational qualifications in the preservation and entire management of IRs, because the way preservation issues are handled here is very poor
YY	... in fact when this IRs thing started, some of us had to learn the techniques on our own through exposure from outside the country and later through workshops and seminars. So we don't even have enough qualified staff of the IRs to be able to have some purposively for the preservation of its content
ZZ	... Staff in this institutional repository are good, but in my opinion and experience do not have the required skills and expertise on what they are mandated to do. I think they should be trained properly including me, because as far as am concerned none of us has been trained
QQ	... We do not have qualified staff ooo, not in IR management or digital preservation, or preservation in total. The staff need proper training
RR	... I wish a university in in this country will have a course solely dedicated to management and preservation of IRs, when this happens most of our staff can be sponsored to go in and be trained, but as it is now they do not come in with any requisite skills so we try our best to train them and they learn on the job
AA	... For one to be called an IR staff, he or she staff should have at least a degree in Information Technology or Computer Science, and diploma in archival studies and library studies. In fact, besides these degrees you also need international exposure. Because for me even if you have the degrees I have mentioned without any outside exposure on how to manage intuitional repositories and digital preservation I will not recommend you
DD	... 90% of what I know about IRs and digital preservation is from my education and exposure outside the country. There is no institution in Ghana that trains people in IRs management or digital preservation. The only library and archives school we have in Ghana is not also taking up this task
BB	... the only university in Ghana which has a department that has a course with some component on digital information known as preservation of information resources If I remember vividly is the university of Ghana. But I must say that although the course was very comprehensive, issues of digital preservation were not pervasive, as they were mainly on how to preserve paper document and microfiche

Table I.

Responses on availability of requisite staff

Source: Field data, 2018

Furthermore, to settle on respondents' claims on unqualified personnel in the IRs, the researchers further sought to find out the total number of staff in their units as well as their educational qualifications. The responses as presented in Figure 3 confirmed the responses from the heads of the IRs. Apart from the respondents themselves who had had some qualification in digital preservation in general as part of their courses studied leading to the

**Figure 3.**

Educational qualification of IR staff

Source: Field data, 2018

award of a diploma in archives studies 1(13 per cent), degree in formation studies 2(25 per cent), master of arts in information studies 3(38 per cent) and master of philosophy in information studies 2(25 per cent), none of their subordinates had any form of training or qualifications in the preservation of digital content in IRs. The total number of staff in all the academic libraries IRs as revealed by the respondents totaled 34 comprising 5, 6, 5, 5, 4, 3, 2 and 4 from the XX, YY, ZZ, QQ, RR, AA, BB, and DD libraries, respectively.

Responses to the question which sort to find out whether IR staff had had any external or internal on the job training however revealed that, even though there was lack qualification in the area of digital preservation, there were some form of training programmes on digital preservation for the staff.

For instance, the respondent from ZZ library declared:

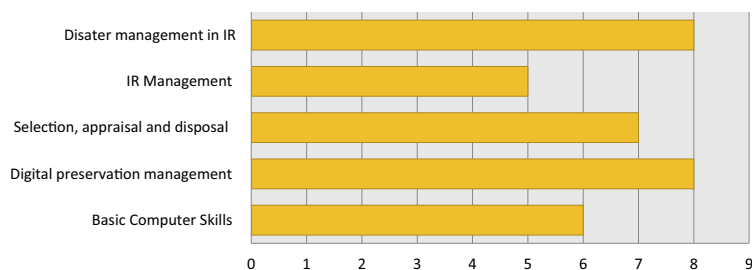
[. . .] yes, there are some traditional training programmes for staff, however, the head of unit, that is me is usually the one who attends such programmes with the anticipation to train my staff on my return. We do this because the money available for training is not sufficient.

All the same, responses from the respondents from the QQ library were contrary:

[. . .] In fact, since I became the head of this unit, I have not had any facilities available to provide training programmes for myself and the entire staff.

Again, respondents were asked to indicate their training needs and appropriate ways of meeting such needs. In answering this question, respondents mentioned; basic computer skills 6(75 per cent), digital preservation management 8(100 per cent), selection, appraisal and disposal 7(88 per cent) general preservation 5(63 per cent), and IR Management 8(100 per cent) as the forms of training, which 5(90 per cent) indicated they would prefer in the form seminars and workshops. Three (38 per cent) of the respondents however indicate that they would prefer to their staff to be trained full time in a school with a course on digital preservation and management of IRs. See [Figure 4](#).

The last question on the management support was to find out whether the IR units were consulted by management on issues relating to the IR and digital preservation. This question was relevant because it is essential to have staff who are satisfied and committed to their work. Indeed, research has shown that employee satisfaction and commitment to work are partly attained when staff are involved in plans that affect their work in one way or the other ([Joo and Park, 2010](#); [Mensah and Adjei, 2015](#)). To this question, 75 per cent of the respondents indicated that although they were recognized as a unit in their respective libraries, management of the library and the university at larger do not consult them when it



Note: $N = 8$

Source: Field data, 2018

Figure 4.
Staff training needs

DLP

comes to issues and decisions relating to their work. This was well captured in the responses from the interviewee from the YY library:

[...] I and my entire staff are not often consulted when it comes to issues relating to our work. Instead of asking us the type of storage facility or software we think will be appropriate, the librarian will rather want to consult the ICT unit instead of us. So generally, we are here receiving whatever “they” think we will need to do our work, and this is not helping at all.

Quite the reverse, it was encouraging when 2(25 per cent) of the respondents indicated that they were always consulted before any decision is taken on the IR. For instance, the respondents from the AA library said:

[...] I am always consulted on issues relating to my work from the technical issues to the human resource issues. Every decision concerning this unit is actually from me before management takes a decision on them.

Challenges of digital preservation facing institutional repositories

Like all other innovations, long term preservation of content in IRs in academic libraries are not without challenges. Thus, to enhance continuous accessibility and sustainability of a library’s active presence on its IR, there is the need to identify potential challenges that could hinder or pose as a threat to the successful preservation and usage of established IRs.

To this end, respondents were asked to point out some of the challenges faced in their quest to preserve the digital collections in their IRs. As presented in [Figure 5](#) all the respondents indicated challenges such as unskilled staff, inadequate funding and technological/software obsolescent. Eighty eight per cent also itemized infrastructure/technical constraints and lack of appraisal/disposal schedules, whilst 25 per cent stated lack of management support.

Conclusions/recommendations

Research has shown that the development of policies that are approval and acceptance by management is fundamental to gaining management support, defining digital preservation strategies, and acquiring resources such as staff, and infrastructure for the IR ([Corletey, 2011](#); [Li and Banach, 2011](#); [da Silva and Manuel Borges, 2017](#)). Digital preservation is a complex process and there are many unsolved organizational, managerial and technical issues that make digital preservation a challenging task for those managing institutional repositories in Ghana. With digital content increasing exponentially in the current information age, careful consideration must be given to the preservation needs of materials to be archived within an institutional repository. It is evident therefore that institutional repositories in Ghana and especially in the academic libraries studied should have a

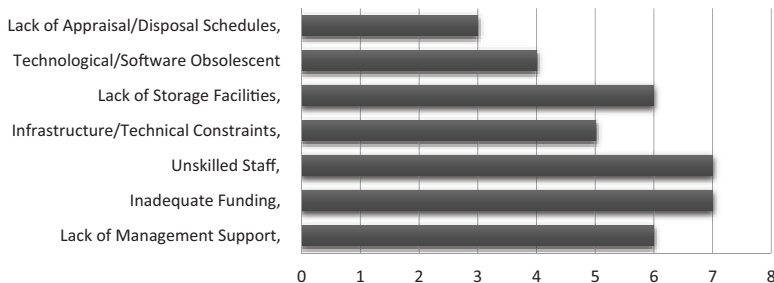


Figure 5. Challenges of digital preservation in IRs

Source: Field data, 2018

long-term and future-oriented preservation perspective. Ghanaian academic libraries developing institutional repositories must hence come to realize the importance of digital preservation. Indeed, as advised by [Wheatley \(2010\)](#), long-term preservation should be regarded as an important function and be addressed by institutional repositories from the start. Nevertheless, as shown in the responses of the respondents interviewed digital preservation seem not be embedded as an integral part of the IRs 'workflow in academic libraries in Ghana, with neither much experience nor commonly agreed best practice as to how digital preservation is best performed. As such, in finding out how the content in the repositories are preserved as well as challenges facing the long-term preservation of such content, this study demonstrates that although academic libraries in Ghana understand the essence of digital preservation in IRs, there are some still some concerns when it comes to development of policies, staffing, funding, and support from management. Despite these challenges, it is very encouraging to see efforts made in ensuring the implementation of digital preservation strategies for the IRs. Amidst all these, the following recommendations and strategies have being suggested to be useful in strengthening and improving long-term digital preservation in IRs in academic libraries in Ghana

Policy development

Findings from this study revealed an absence of a policy for the management of content in the IRs. This is not encouraging, because developing preservation policies ought to be the first step toward guaranteeing preservation actions. Indeed, the strategies for preserving IR content and the decisions about what content requires short, medium, or long term preservation should be driven by preservation policies ([Li and Banach, 2011](#)). Further, a comprehensive digital preservation policy can be done within the context of institutional repositories, for different types of content, to help decision-making, and answer the questions relating to; what content to select and keep, and how long to keep them.

Digital Preservation Strategies Digital preservation techniques are most effective when they are pre-emptive, as it is often impossible or prohibitively expensive to restore a digital object that has become corrupted or obsolete ([Lavoie and Dempsey, 2004](#)). However, this study revealed that although the IRs had some preservation strategies in place, there were no formally documented disaster management plans. The authors therefore advice that, academic libraries draw up disaster management plans for managing disasters that are likely to occur. This can range from system failure, fires or flood etc. This plan should address the protection of vital documents, and risk assessment exercises should also be undertaken.

Management support

The management of IRs is a function performed through the collective support of all individuals in an organization. In particular, support from management is at the top of the parameters used to attain institutional success. Thus, without adequate management support, technological aspects or content-centered aspects of digital preservation in IRs are not sustainable. In fact, supportive management systems in academic institutions about IRs to successful outreach in securing content can make or break a digital preservation initiative ([Moulaison Sandy and Corrado, 2018](#)). This study therefore recommend that top level management support should be provided to ensure that digital preservation in IRs in academic libraries in Ghana is a success. If possible, staff involve in all activities of the IRs management should be consulted on issues concerning what they do. Furthermore, the results of the study revealed that the IRs do not have adequate and sustainable funding for the management and long term preservation of content. Budgets for managing the IRs being factored into the overall budget of the entire library as a whole is a concern. This is because, when organizations factor budgets for IR management into

the budgets for other divisions in the organization, the facilities which are needed in the IR units would have to compete with the needs of the entire library. At best, it is quite doubtful whether the competitive needs of the IRs where the budgets for management of the repository have been factored into the overall budget of the entire library will allow for peculiar IR management needs to be met. As such, this study recommends, that, if possible, efforts should be made to separate the budgets of the IR from the overall budget of the library or otherwise be a dedicated budget that will also be channeled to IR activities.

Moreover, the human resource of any organization serves as the nerve on which the organization thrives. Thus, to guarantee an efficient and successful long term access to IRs, there should be staff with the requisite skills and knowledge on its management. On the contrary, findings from the study revealed that the IRs in academic libraries in Ghana do not have staff with the requisite skills, expertise and education in IRs and digital preservation. The authors therefore recommend that those already on the job should be given adequate on-the-job training in digital preservation with available facilities to attend workshops and seminars on such themes.

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Appendix. Interview schedule

Name of institution

Institutional repository policy

- (1) Do you have an IR policy?

Digital preservation strategies

- (1) Does the IR have storage and backup facilities, and if yes what type of backups do you have?
- (2) Does the IR have disaster management plans for the protection of its content in case of disasters?
- (3) Which of the following equipment do you have in your IR? E.g. Fire extinguishers, smoke detectors, fire detectors, etc.
- (4) In case of disasters or power failure, how soon can the IR retrieve its content?
- (5) In your opinion, what would you say is the future prospect of the IR?

Management support

- (1) Is there a budget and adequate budget for IR activities?
- (2) Does the IR unit have the staff with the skills and knowledge to manage its content?
- (3) Are there provisions for training programmes for IR staff on digital preservation issues?
- (4) What are the preferred training needs of IR unit staff?
- (5) Is the IR unit consulted on issues concerning its work?

Please give your candid view on the state of the preservation of content of the IR and how it can be improved to ensure long-term preservation.

Thank you very much.

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