

Title: Building librarians' skill in research data and output management: Case study of librarians at Sam Jonah library (University of Cape Coast) and Osagyefo library (Winneba campus)

Name of Speakers:

(1) Vida Mensah

Institutional Affiliation: University of Cape Coast

Email: [vida.mensah@ucc.edu.gh](mailto:vida.mensah@ucc.edu.gh)

Telephone: 0248813275

Professional profile:

(2) Matilda Ampah-Johnston

Institutional Affiliation: University of Cape Coast

Email: [mampah-johnston@ucc.edu.gh](mailto:mampah-johnston@ucc.edu.gh)

Telephone: 0209180956

## **Abstract**

The purpose of this paper is to determine ways of building the capacity of librarians in two academic libraries in Ghana, to meet their extended role of managing research data and output.

The study adopted both qualitative and quantitative methodology with the use of semi-structured interviews and questionnaires. It was supported by documentary analysis of data collected from 11 senior members, and 13 Principal library assistants with post graduates degree in information related courses from the Sam Jonah Library and 16 professionals with post graduate degree in information studies from University of Education, Winneba library. Thus a total of 40 staff as a sample size.

Some of the major findings are as follows: Though most librarians have an idea as to what constitute research data and its management processes, this knowledge cannot be said to have fully solved the challenges of managing research data in these academic institutions. There is also a revelation that most librarians classify research output as research data; respondents specified that even the research output repository managed by the libraries have few management challenges.

Ghana can confidently boast of about twenty academic and research libraries, the study was however limited to two academic libraries, excluding the research libraries.

The following are the implications of the study: firstly effective data management can help build up data reserve libraries and institutions can use strategically to help other researchers in the institution. Secondly data management roles of Librarians are associated with required knowledge and skills that cannot be overlooked.

The study revealed that, currently most academic libraries have policies and systems that manage the institutional research outputs; however libraries can do more to help manage the data that produces these outputs as well, to actively support research lifecycle in our academic institution.

Keyword: Research data, Research output, Data management, Academic libraries, Capacity building

## **Introduction**

Academic libraries have been striving to remain relevant as well demonstrate their value in this technological age to their parent institutions. Though the value of libraries in academic environments has long been a topic of research and argument among librarians, it can be argued that within the context of academic libraries, the relevance and value of the library can strictly be linked to the parent institution's mission statements, values and its working strategic plan. (Brown, Wolski & Richardson, 2015)

Most academic institutions are geared towards training graduates and researchers who can produce quality research output that can foster national development. Quality research output improves an institution's visibility, both locally and globally as well as giving the individual researchers within the institution the opportunity to participate on external committees, or publish in peer-reviewed journals. It can therefore be concluded that, an academic library's ability to provide the needed assistance, accurate, reliable and complete information resources in a timely manner to researchers will amount to its relevance and value, towards the goals of both individual researchers and the university community at large.

Research data are the main asset of scientific, economic and social research. They are the root for any research and also the definite product of research. The importance of a quality research data and its source is therefore necessary, particularly when data sharing and re-use is becoming increasingly important within and across academic disciplines. (Brown, Wolski& Richardson, 2015).

As mentioned earlier, the research process in universities is becoming more and more competitive and demanding, as such, it is now possible to gather a significant amount of data within a short space of time. These data enable many problems to be investigated for solutions. The question that needs to be addressed however is, what becomes of these data after the research? Undeniably, a significant amount of the data is even lost before the research process is completed due to lack of proper management.

Institutions can track grant applications of their researchers, collaborations being built with other researchers, conferences presentations and their areas of expertise. All these are research data that can enhance an institution's research package. Academic institutions can also use these to track the research output and performance of graduates and faculty members, and also showcase what is being done to attract funding and collaborations. But these can only be achieved if these data are well managed within the institution.

Often, libraries and librarian's strategic and personal relationship with the universities research centers, senior management, faculty and individual researchers, ensure proper management of their research outputs and repositories. Since librarians cannot be side lined when it comes to showcasing their institutions' research expertise and experts, promoting and supporting the sharing of open data, managing repositories and curating research data, their professional development towards these needs has to be addressed accordingly to equip them for their roles.

### **Problem Statement**

Globally, there has been an extensive dialogue on the vital roles academic libraries can play towards their research community in recent years. Academic libraries in Ghana are therefore developing and implementing new roles and service models, especially in the area of research output. A closer look at roles towards the management of data that give "birth" to these rich outputs would be an advantage to the library and the institutions at large.

Although the librarians under study have taken some initiatives to meet the emerging role of librarians in supporting the new area of research output management, there is still much to be done to include managing research data within their parent institutions.

Managing research data is an essential part of the research process, but many individual researchers have challenges in ensuring that their data can be stored in a secured manner while remaining accessible and not obstructing their research activities. These challenges can be confirmed by their

inabilities to perform simple activities like naming files for easy and quick identification, keeping track of different versions of files, and deleting those not needed, backing up valuable data and controlling who has access to their data among others.

Despite the benefits of managing data in institutions, earlier studies like (Gary, 2013; Lewis, 2010) also identified some factors that constrain individual researchers to perform data management activities. According to these studies, “some researchers do not have the technical skills to do the metadata work, which is mostly technical in nature”, and there are no consistent storage infrastructures, coupled with time constraints to organise the data. Bruhn (2014).

Some scholars are of the view that, academic libraries and librarians should provide a leading role in research data management support on behalf of the researchers, as this will help to minimise the challenges that researchers face in fulfilling the directives from some funding agencies and research counsels and also ensure long term storage, preservation and re-use of data(Cox &Pinfield, 2013).

Though there are scholars who argue that most of the research data support services could be seen as an expected extension of the existing library work and it is just a matter of renaming the services that the library offers Any academic library that seek to manage data, needs to build capacity of individual librarians who will be responsible for these activities and also build the needed infrastructure for consistency. This paper therefore focuses on how to build capacity to identify

ideas for useful tools, practices and services towards managing research data and output, particularly data in Sam Jonah and Osagyefo library respectively.

Academic libraries have long been providing some sort of research support to researchers, and have been involved in managing, preserving, and providing access to information. It is important that research data is well managed to make it discoverable, accessible and connectible to enable innovative re-use. Research data management by the library can therefore be beneficial for the library as well as the students, other researchers, the institution and can improve external collaboration and partnership while ensuring copyright protection, (Ingram, 2016).

### **Objectives of the study**

- Is to examine the roles of Sam Jonah and Osagyefo libraries in supporting researchers to manage data in the University of Cape Coast and University of Education, Winniba.
- Examine the readiness of Sam Jonah and Osagyefo libraries and librarians in taking up their additional role in response to research data and output management in their institutions.
- Identify the capacity needs of the librarians with respect to research data and output management in the University of Cape Coast and University of Education, Winniba

## Literature Review.

### The Concept of Research Data

Research data, in this context, refers to the information that is generated or collected to be used as primary sources in the production of original research results and would be required to validate or replicate research findings. According to Burnham (2012), research data can be classified according to the processes used to gather or generate them, and these are:

- Experimental data: generated by lab equipment (e.g. gene sequences or chromatograms)
- Computational/Simulation data: generated from calculation models – the actual model (and metadata about the model) may be more important than the output data (e.g. climate models, economic prediction models etc.)
- Observational data: recordings of specific phenomena at a specific time or location (e.g. seismic data, medical imaging, opinion polls, climate data etc.)
- Derived data, produced via the processing or combining of other data (e.g. data mining, compiled databases etc.)
- Canonical data: data extracted from reference datasets (e.g. GenBank, HILDA etc.)

### Research Data Management

Research data management is seen as all the activities involved in the planning, organisation and preservation of research data. It includes all activities that ensure that data is safely stored, is findable and can be used to reproduce findings. Any good data management will begin with a plan



that will help to support data reuse beyond the life of the project that generated it. It can also show how data will be protected. (Imperial College London, 2016)

### **Reasons for Managing Research Data**

Research data is an important element of the research procedure, and some data would be impossible or difficult to retrieve if lost; for example recordings of a specific seismic event. Some data may also serve additional purposes for other researchers and students; for example the geographical map of a region or town collected by a geographer. Good management practices will therefore ensure that researchers are able to meet any obligations related to data retention by guarding against the misfortune of data loss. The effective management of research data will also inform research integrity by enabling the tracking of data from collection to results. This will increase the repeatability of the research should it ever be necessary to defend a knowledge claim.

From the above discussed, it is clear that researchers have a responsibility to manage research data effectively, but do they have the requisite skills for it? Though the responsibility for data management lies primarily with researchers, the library can provide a supporting framework of guidance and training, tool infrastructure and support staff that can help with many aspects of data management.

## **Role of the Library in Research Data Management**

Globally, academic and research libraries are implementing Research Data Management (RDM) services in support of university research activities. In Africa, some academic libraries are providing frameworks for these services with some degree of success as policies, infrastructure set up, library staff training, as well as awareness and advocacy campaigns held with academic staff and researchers (Chiware&Mathe, 2016). Chiware&Mathe, (2016) also mentioned Cape Peninsula University of Technology (CPUT) Library as an academic library that has taken a leading role in creating platforms, systems and processes for the management of research data for their institution. The development of Research Data Management services should therefore be part of an academic library's own strategic plan which is closely linked to the institutional goal of producing quality research output.

The Library's role in Research Data Management may include the planning, curation, dissemination and promotion of the research outputs in terms of articles and theses, the curation of research data through research data management systems and data repositories, or a cloud-based service for academic and research staff, at no cost to use their institutional email address to sign up, or add it to an existing account. They can also train highly skilled staff, develop research infrastructure and build collaborations with other research stakeholders within the institution to train and equip researchers to manage data personally, as well as advocate for the need for data sharing and re-use and ensure copyright protection. (Chiware&Mathe, 2016).

All these activities should however begin with a proper data management plan.

A data management plan is a formal document that outlines what the library and researchers will do with the data during and after research processes. It describes the data that will be created, the standards used to describe the data (metadata), the ownership of the data, who can access the data, how long the data will be preserved (and/or made accessible), and what facilities and equipment will be necessary to disseminate, share, and/or preserve the data. (Craigin et al, 2007).

### **Building Capacity for Research Data Management in the Library**

Undeniably, Research Data Management plan and policies alone cannot be adequate for managing data effectively in the library. The library needs to build and improve RDM capacity of employees. Developing Research Data Management service must start with identifying existing competences within the library and analyzing new needs for competences and skills development. A report by Johnsson and Åhlfeldt(2015) for Lund University suggested that, there should be an established formal section “Research data management and co-ordination” in university libraries to co-ordinate and promote the activities in RDM towards, faculties, university management, and other university research support functions. Staff at different sections of the university library, such as digitization services, digital collections, scholarly communication, may also play important roles in the Research Data Management process, by acting as experts in their specific domains if they have the requisite skills.

Data management staff can be trained to build capacity on: Basic data management, data management planning, data life cycle, archiving, subject classification of research data, i.e. DDI (Data Documentation Initiative) metadata standards, copyright and licenses, i.e. legal prerequisites and research ethics in managing research data, data collection methods, preparation for sharing, de-identification of personal data , data identifiers such as URI, methods for text encoding such as XML and other formats among others (Johnsson&Åhlfeldt ,2015).

### **Methodology**

The study adopted both qualitative and quantitative methodology with the use of semi-structured interviews and questionnaires. The mixed methodology helped to get answers from a number of perspectives. It also ensured that there are no ‘gaps’ in the information/data collected. It also eliminated some pre-existing assumptions from the researcher. (Stange K et al 2006).

### **Population**

The population for this study is the professional staff of Sam Jonah library and Osagyefo library. Thus, the senior members who form the management body of these libraries, comprising the Librarians, Deputy Librarians and the Assistant Librarians and Principal library assistants with post graduate qualification in information studies.

### **Sampling and Selection of Subjects**

Available statistics from the libraries show a total of 11 senior members, and 13 Principal library assistants with post graduate degree in information related studies from the Sam Jonah Library and 16 professionals with post graduate degree in information studies from Osagyefo library. The study used all 40 staff as a sample size. There was therefore no sampling in this study, as all professional staff were included in the study considering the population size. (Murray and Warm, 2003)

### **Instrumentation**

The study adopted a questionnaire and interview guide as the main data collection instrument.

The questions and interview guide were informed by the research objectives. The questionnaires consisted of open-ended questions. The open-ended questions allowed the respondents to express their opinion on the topic under study

### **Results and Discussions.**

#### **Background of Respondents**

The background information sought from respondents their level or rank and number of years of service in the library field. This was to enable the study ascertain whether the rank of librarians

and the years of service has any link with staff knowledge of what research data and its management is.

Table 1: Staff Categories of Respondents

<b>Table 1: Staff Categories of Respondents</b>		
	Frequency	Percentage
<b>Principal staff</b>	22	78.6
<b>Senior members</b>	6	21.4
<b>Total</b>	28	100.0

**Source: field data, 2018**

Out of the 28 respondents representing 70% of the total sample size, 22(78.6) are principal library assistant and 6 (21.4%) are senior members. 3(10.7%) of the respondents have served in the profession for 1-5 years and above 20years respectively.13(46.4 %) respondents have been the profession between 6-10 years,5(17.8%) have been in the profession between 11-15 years whiles 7(25.0%) of the respondents have been in the profession between 16-20 years.

**The Concept Research data management**

**Table 2: Definition of Research data management**

Statement	Yes	No
<b>The effective handling of information that is created in the course of research</b>	<b>21(75.0%)</b>	<b>7(25.0%)</b>
<b>The planning, organization and preservation of the evidence that underpins all research conclusions</b>	<b>23(82.1%)</b>	<b>5(17.9%)</b>
<b>Practices that ensure that data is safely stored, findable and usable to produce results</b>	<b>25(89.3%)</b>	<b>3(10.7%)</b>
<b>Research activities aimed at increasing data availability</b>	<b>22(78.6%)</b>	<b>6(21.4%)</b>

The study sought to find respondents’ understanding on the concept of research data management. From the result, most librarians have an idea as to what constitute research data and its management processes. This knowledge however cannot be said to have fully solved the challenges of managing research data in these academic institutions. From an informal conversation between one of the researchers and a faculty member, the latter disclosed” *I just save my data on my pen drive or computer, sometimes I lose it when the drive is lost, but that’s the best I can do*”. It can be argued that there are a lot of individual researchers even among the librarians whose research has generated some useful data that no one else know or would know of or reuse unless such are managed and made available ((Wong, 2009).

## **Role of the Library in Research Data Management**

Indisputably research data challenges have responsibilities for academic libraries, as they are traditional custodians of knowledge. These roles start from mainly acquiring published literature to managing literature and collaborating with researchers who develop and use research data (Goldenberg-Hart, 2004). Academic libraries are seen as preservation institutions with resource management infrastructure and librarians as information professionals with resource/research management expertise who are believed to have capabilities to deal with all data challenges (Borgman, 2010; Jones, 2008).

This study sought from respondents the role(s) the Libraries are currently playing towards research data management in their institutions. Though all the respondents {28(100%)} indicated that they believe the respective libraries have data management responsibility towards the universities, most believe that the library is already performing these roles through the institutional repository and the DATAD(Database of African Thesis and Dissertation). This indicates that most librarians classify research output as research data, and therefore believe that since the library runs an institutional repository that manages the research output of the university and also provides some sort of research assistant to graduate students, the library is already managing research data for the university. Research output can be classified as data of some sort to other researchers (It can be the root for other research though it is a definite product of research), but the classification of



research data as indicated by Burnham (2012) makes research output just a component of research data. Currently Sam Jonah library manages the institutional repository (IRs) for the research output that is being utilized to actively support research lifecycle of the university of Cape Coast. However, personal observation has shown that, the library can do more to help manage the data that produces these outputs as well. An interview response from a respondent specified that even the research output repository managed by the library have few challenges like inadequate visibility, and much needs to be done to improve it. It will be important for the librarians to understand how to manage the useful data that generate the output as well. Academic libraries have long been institutions that preserve literature and knowledge and as well act as stakeholders to learning and teaching. Academic librarians therefore play a key role in these supportive roles of the library, and must understand these responsibilities (Macdonald, 2009).

### **Readiness of the Library for Lead Roles in Research Data Management**

The study further sought from the respondents, their perception of the readiness of the two libraries in taking up their additional role in response to research data management in the Universities. The results (14)77.8% from the Sam Jonah Library and (10)62.5% fro Osagyefo library respectively, shows that the libraries have what it takes in terms of human resource and infrastructure to take up this responsibility, however, in order to perform this role effectively, librarians need to understand the role dimension of managing research data and function within

the right work settings with the requisite skills to ensure the sustainability of data services. An interviewee gave a response that, “*Sam Jonah Library should work in partnership with campus agencies like the ICT department to improve the management of data because it’s teamwork*”.

The study inquired from respondents, their views on measures the libraries are taking to ensure the effective and sustainable research data management for the university community.

**Table 3: Measures put in place currently to handle research data management effectively by the libraries.**

Statement	Yes	No
<b>Research data management plan</b>	5(17.9%)	23(82.1%)
<b>Long term research data storage</b>	7(25.0%)	21(75.0%)
<b>Data preservation</b>	9(32.1%)	19(67.9%)
<b>Research data policy</b>	6(21.4)	12(42.9%)
<b>Research data dissemination</b>	18(64.3%)	10(35.7%)

Source: Field data, 2018

The results as shown in the table 3 above indicate that, apart from data dissemination both libraries do not have any known measures pertaining to policy and plan to ensure long term preservation and storage of research data. Most interviewees were of the view that, the libraries should start with a workable policy on data management to pilot it. It can therefore be concluded that, the library partially engages in research data management for the university community. This

revelation makes the readiness of the library to take a lead role in data management as indicated by respondents debatable. It also confirms Ball (2013) attestation that, many libraries are eager to take on new roles in providing support for effective research data management (RDM), but lack the necessary skills, plan and policies to guide its implementation sustainability.

### **Building Capacity for Research Data Management in the Library**

Capacity building is a means to address the knowledge and skills gaps in professional competences. The need for data management skills development is important for librarians, as this will enable them to have the skills to effectively manage research data. Capacity building is one of the most important aspects of any work development because it builds both human and social capital which are integral elements to effective service provision.

According to Ball (2013) “capacity building” tends to be a general term which is not always well-defined, and there can be a risk that a library may waste time and money on programs and activities that can end up building the wrong skills or targeting the wrong people.

Need assessment should therefore be carried out by any library that seeks to build capacity for data management. The need assessment will identify whose capacity the library needs to build, which areas to build capacity for and why to build the capacity, when these capacities need to be built, who should deliver the capacity building and how to evaluate it.

Identifying capacity needs of the librarians with respect to research data and output management in any academic library is of importance. The study sought from respondents if they have skills in research data management, majority, 23(82.1%) of them affirmed that they have some basic skills, when the study further sought to find out areas in which respondents have skills, there was a contradiction as only few confirmed that they have skills for data technical infrastructure support and development, expertise services, curation services and education service for data management. This reveals a great professional gap with respect to data management, starting with data management awareness among librarians. (Kahn...et al, 2014).

### **How to Build Librarians capacity to perform Research Data Management Services**

Ideally most university researchers would seek the assistance of an expert throughout their research process if possible. Many research libraries are therefore building relationships with research service centers as researchers are often referred to a librarian when writing a grant proposal for a new research project and other research activities (Whitehead & Bourne-Tyson, 2016). Librarians can only meet this role when they have the requisite skills. In order to provide support in the data life cycle process the library staff needs competence development into new areas.

This study confirms the need for librarians to acquire the requisite skills for data management since much of the training and competence development could be performed in-house, by different

university functions and specialist in the profession through training workshops, seminars, short courses, conferences and educational institutions that train professionals.

Training workshops address specific and general deficiencies in some research areas such as improve data collection, management and analysis. Workshops are quick to mount and also serves as a primary vehicle through which training needs can be addressed. It can also be tailored to deliver specific skills or updates on new developments in the particular area of specialization. Libraries can therefore use workshops which are quick to mount and responsive to local needs to build capacity for research data management.

There is already some knowledge in the library organization on data management as identified by this study, but there is the need for more in-depth competence on these areas, if the library should be an essential partner in research data management at the university.

Professional training institutions can also incorporate courses on research data management in their curriculum to equip their graduates effectively.

### **Recommendation for Capacity building and Research Data**

#### **➤ Workable policy for data management**

Policies drive actions and make employees understand actions. It also spells out the scope of activities that can help identify training needs and staff to be trained. Well-written policies on data

management will convey to employees what is expected of them with regards to research data management, and serve as a form of internal control.

➤ **Managing data collections in Data Repository**

Storing Research data in a repository can make it easily accessible. Properly formatted data citation for the dataset will be helpful. The library can use constant identifiers to help with easy identification and retrieval from the database. (e.g:SSD/01/2011, Social Science data no.1 from 2011.). Specific keywords and tags that make the data more likely to be found can be used. The library can select a format for storing the data that is intended for long term.

- Research centers within the universities like the graduate schools can enable usage reporting on all data created by researchers within the institutions.
- Researcher/Library collaboration on data management. The library can also organize training on data management to researchers.
- Advocacy services, example promoting the benefits of Open access to Research data and research data management.
- Build infrastructure support and adequately train staff through workshops and seminars on Research data management.

## CONCLUSION

Research data management is a relatively new concept in Ghanaian academic libraries as compared to other institutions in the developed countries. Nonetheless, the concept is very important and librarians, research officers, records managers, information technology professionals and researchers need to explore the concept so as to effectively participate in good research data management practice. The establishment of research data repositories or the use of already established research data repositories can ensure that research data management standards are adhered to when doing research. There is also need to partner with international organizations such as research centers and training institutions in managing research data professionally.

If research data are well organised, documented, preserved and accessible, and their accuracy and validity is controlled at all times, the result is high quality data, efficient research, findings based on solid evidence and the saving of time and resources. Researchers themselves will benefit greatly from good data management. Data management should be planned before research starts and may not necessarily incur much additional time or costs if it is engrained in standard research practice. Establishing the roles and responsibilities of all parties involved is key to successful data management and sharing.

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