

# Digital Scholarship and Open Science Imperatives for Nigerian Academic and Research Libraries

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## ABSTRACT

The ubiquitous digital technologies continue to maintain steady, in some cases, and in most instances, overwhelming impacts on virtually every domain of human endeavor. No doubting it, scholars and the environment in which they conduct their works are changing with time and technologies. Nearly every aspect of the research process now has one digital tool or the other to perform it be it conceptualization of idea, laboratory assay, data analysis, communication or publication of research results, search and access of information, bibliographic referencing and all. Emerging from the intersection of digital content, networked distribution and Open practices, digital scholarship (DS) is a concept that is not just about technologies but also concerned with ideological issues like openness in relation to the conduct and communication of research. The Open Science (OS) arm of DS, has received growing global attention and discourse such that it has led to the evolution and development of policies and infrastructure at both disciplinary, national and international levels to foster Open practices. To this end, this paper reviewed extant literature using the paper synthesis approach to expatiate on core constructs and reviewed the status of research on digital scholarship in Nigeria. Based on the identified dearth of research on the subject and observed low participation in DS, the paper challenged Nigerian academic libraries to follow the models of north American and China reported in the literature to meet the scholars in their new environment by rendering digital scholarship services (DSS) through the establishment of a specialized unit of the library.

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## Introduction

The ubiquitous digital technologies continue to maintain steady, in some cases, and in most instances, overwhelming impacts on virtually every domain of human endeavor. With the overwhelming resort to them since the onset of the ongoing COVID-19 pandemic in

particular, the adoption of digital technologies has accelerated across disciplines, cultures, societies and communities of practice such that the present era of socio-technological evolution of the world is described as the “new normal” (Adeyemo et al., 2021; Igbokwe et al., 2020; Okebukola et al., 2020). Technologies have diffused more widely and rapidly to places and among people that hitherto would have lagged were it not for the new normal era occasioned by the pandemic.

The same applies to the educational sector where digital scholarship and open science regained momentum as these paradigms were heavily relied upon for the continuance of learning, research, communication of research outputs and collaboration during the pandemic and now hereafter. Relatedly, the ethos of open science became the forefront guiding principle for the communication of research on the novel virus as many reputable publishers embraced the open access practice as their contributions to help mitigate the effect of the global crisis (Besançon et al., 2021; Lee & Haupt, 2021).

In the same manner, institutions of higher learning that sustained their academic calendar had to shift to virtual learning mode to teach and conduct examinations. Some other aspects of academic life of researchers such as periodical scholarly meetings in conferences, symposia, seminars leveraged digital technologies to hold. While existing video conferencing technologies like Zoom, Webex were overwhelmingly deployed, new platforms like Microsoft’s Teams<sup>®</sup> emerged to take a share of the booming market of technologies that run the moment with potential for sustainability in the future (Ilag, 2020).

All these point to the importance of technologies and the more reason to consider the new environment in which scholarship is being conducted and will be carried out in the years ahead. No doubting it, the scholars, and the environment in which they conduct their works are changing with time and technologies. Nearly every aspect of the research process now has one digital tool or the other to perform it be it conceptualization of idea, laboratory assay, data analysis, communication or publication of research results, search and access of information, bibliographic referencing, and all. It thus appears the antecedent of digital scholarship is scholarship. So, what is scholarship?

Before defining scholarship, it is important to acknowledge that the modern world exists in two forms: virtual and physical. The virtual is a mimicry of the physical or traditional form. The mandate of digital proponents seems to be the replacement of traditional ways of doing things with easier approaches leveraging the capabilities of the ubiquitous information and communication technologies (ICTs). Thus, knowing what scholarship is will help in conceptualizing digital scholarship in the proper context.

## **1. Scholarship: Definitional and Historical Perspectives**

Historically, the term scholarship was first used by the Pharaohs of Egypt in 2500 BC who presumed that true scholarship shows “commitment, persistence, innovation, leadership, and intelligence” (Mirhosseini et al., 2018). The etymology of scholarship revealed that the word has its roots across the dominant languages of the ancient world. The Latin word “schola” i.e. school, Greek word “skholē” meaning “leisure, philosophy, and lecture-place”, Old

English word for schoolchild or student, “scolere”, the Middle English scoler, Anglo-French escolar and Medieval Latin scholaris are some of the originating words that form the base from which the concept of scholarship emerged (Mirhosseini et al., 2018).

And the word scholar, whose known first mention dated back to the 12<sup>th</sup> century, according to the Merriam-Webster dictionary means “an intelligent and well-educated person who knows a particular subject very well” (*Definition of Scholar*, n.d.). Scholars are also described as people who are “deeply engaged in teaching and learning and directing this process” (Mirhosseini et al., 2018). From the foregoing, it appears scholarship has knowledge, teaching and learning as its focal points.

But over the recent past, scholarship appears to have been misconstrued among the academy to imply solely research such that it is used to describe research excellency (Mirhosseini et al., 2018) or being scholarly, that is, “having academic rank in a college or university and being engaged in research and publication” (Boyer, 1990). This notion is buttressed by the 19<sup>th</sup> and 20<sup>th</sup> century American academy where college and university faculty are assessed primarily based on their research outputs (Boyer, 1990). In fact, teaching of undergraduate students was relegated as faculty were not rewarded for such endeavour but by research and publication which Boyer averred “have become the primary means by which most professors achieve academic status”.

Challenging this trend, Ernest L. Boyer in the closing decade of the 20<sup>th</sup> century maintained that the word research, first used by English reformers in the 1870s, is a recent entrant into the academy. The report of his Carnegie Foundation-funded study titled “Scholarship Reconsidered: Priorities of the Professoriate” aimed to ameliorate the losses associated with the narrow view of scholarship and proposed an expanded approach to capture the full range of faculty work bordering on research, teaching and service. To achieve this, Boyer proposed four general views of scholarship, viz, discovery, integration, application, and teaching which he described as the overlapping functions of the professoriate that he dubbed four scholarships (Boyer, 1990).

First, the scholarship of discovery, which relates to what is known as research; the scholarship of integration which involves multidisciplinary and “fitting one's own research, or the research of others, into larger intellectual patterns” (Boyer, 1990, p. 19); thirdly, the scholarship of application which has to do with service to the larger society outside the academia; and lastly, the scholarship of teaching by which other people understand what is known by scholars. These four form the enlarged view of scholarship that today's socio-technological developments have affected. Such developments as digital scholarship and Open Science (OS) concepts like citizen science, open access, open educational resources, open data, etc. find meaningful explanation in this view of scholarship.

The paper will now proceed by describing the concepts of digital scholarship and open science. It will also narrate cases of how libraries are adjusting their services or creating new ones to serve the digital scholars and make case for how Nigerian libraries can do same.

## 2. Digital Scholarship

The rapid evolution and growing adoption of ICT in scholarly activities ditto paradigmatic changes in scholarly communication brought about the Digital Scholarship (DS) concept. Specifically, DS has been reportedly noted to evolve from some socio-technical developments. These developments, according to Weller M., are “digital content, networked distribution and Open practices” (Weller, 2011). Several attempts have been made to define DS (Cox, 2016; Purdy & Walker, 2010). Other scholars have however cautioned on not confining the rapidly growing concept with a gauged definition so as not to block its experimentation and adoption (Mulligan, 2016; Zhou et al., 2019).

Notwithstanding, Rumsey’s 2017 definition of DS in his Scholarly Communication Institute Report remains the most widely quoted. DS is “the use of digital evidence and method, digital authoring, digital publishing, digital curation and preservation, and digital use and reuse of scholarship” (Rumsey, 2011, p. 2). Some researchers also described DS as the use of digital tools, technologies and methods to support all categories of scholarly duties (Li et al., 2020; Mitchem & Rice, 2017). DS has also been reported to play important role in multidisciplinary methods to solving complex research by connecting datasets, knowledge and the scholars noting that DS stimulates and facilitates research discovery and collaboration (Gbaje et al., 2020).

With DS becoming the new normal for research and development (Li et al., 2020), every section of the academy that support the research process ought to trend along this new normal. In this regard, the library in particular, which is the heart of the university research enterprise, must evolve along the scholars whose changing works and work environment they exist to serve. According to Li et al. (2020, p. 1) “libraries have become the engine and platform for knowledge creation, retention, sharing and utilization”. Libraries are now presented with opportunities to use the ICTs to better serve the scholarly community.

## 3. Digital Scholarship and Open Science

Although, inspired by technologies relating to the Internet, and broader ICTs, digital scholarship has been found to extend beyond mere application of these technologies to research, teaching, and collaboration but also the embrace of Open ethos (Pearce et al, 2010). Classifying Openness as both a technical and dispositional concept, Weller defined “Openness” to mean both “the technology and the practice of sharing content as a default.” According to him, while scholarly content includes a broad range of items such as “data, journal articles, teaching material, presentations, discussion, seminars and comment”, technologies include open-source software, open APIs, or open standards (Weller, 2011).

The Open ideal in digital scholarship appear thus to be wired around the concept of Open Access (OA) which itself is recently broadly captured as Open Science (OS) or Open Research, an umbrella term that encapsulates the global movement that seek to ensure practices such as collaboration, research reproducibility and citizen science among others. OS also seeks to promote research practices that take into account the principle of FAIR (Findable, Accessible, Interoperable and Reusable) (Wilkinson, et al 2016). OS also allows for the free

and immediate availability of published research (OA), research data (Open Data), laboratory notes (Open Lab), peer review (Open Peer review) and other processes in the research workflow “under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods” (*Open Science Definition* / FOSTER, 2021, p. 1).

Beginning with the OA movement in the early 2000s, the Open Science (OS) arm of DS, has received growing global attention and discourse such that it has led to the evolution and development of policies and infrastructure at both disciplinary, national and international levels to foster Open practices (Adegbilero-Iwari et al., 2023). Declarations and mandates have been made to further coordinate and achieve the ideals of Open, the most recent being the UNESCO Open Science Recommendation draft that was recently adopted by member states at its General Conference in November 2021 (*UNESCO Recommendation on Open Science*, 2022). To this end, a lot of approaches/model have been proposed to sustainably fund Open and thus enshrine the culture in scholarship. Prominent among them are the transformative deals that giant commercial publishers are striking with institutions, consortia, funders, national and regional governments. The Plan S, formed in September 2018 as an OA funding model to speed up OA publishing by a group of funders known as cOAlition S (Schiltz, 2018), is a modest reference point in this regard.

While most of these activities and efforts are predominantly engaging the scholarly space of the global North, not much can be said of the same in the South which is often on the wrong side of bad Open Access publishing practices, encapsulated in the “predatory” publishing milieu. All these put together present unprecedented opportunities and challenges for academic libraries who for ages have served as critical partners towards achieving the research agenda of their colleges and universities.

#### **4. Libraries, Digital Scholarship Services and Open Science**

DS has brought about the necessity for libraries to restructure and create new services or modify existing ones. Describing DS as the response of the research and development to the digital evolution (Li et al., 2020), the set of services accompanying DS in the library can thus be referred to as digital scholarship service (DSS). These services cover a broad range of library-oriented activities or duties that enhance the various stages of the research workflow. The Joint Information Systems Committee (JISC) in the UK was reported to have developed the research workflow framework which showed that the research lifecycle comprises of five related stages: formulating research ideas, locating research partners, writing proposals, conducting research and publishing results (Liu, 2017). The framework was used by two successive studies in China through both literature analysis and empirical assessment to develop a holistic DSS framework (Li et al., 2020; Zhou et al., 2019). The DSS framework comprises of “25 specific DSS under six themes: supporting services, formulating research ideas, locating research partners, writing proposals, conducting research and publishing results” (Zhou et al., 2019, p. 113). This extensive literature review and analysis was followed up by an empirical study that assessed researchers’ and students’ requirements of DSS in Chinese university libraries. The study identified 17 DSS requirements under five main themes relating to the DSS framework (Li et al., 2020).



Broadly, Gbaje et al. (2020, p. 217) described DSS in the light of services rendered by libraries in support of the growing range of digital scholarly outputs such as “multimedia, databases; qualitative and quantitative data, digital text and images, and computational data sets”. Also, DSS “covers data curation and management, digital publishing and visualisation, database support, software development, and interface design” (Mulligan, 2016).

Specifically, Lippincott (2017) in Gbaje et al. (2020, p. 217) stated that DSS includes: digitization and digital preservation; metadata creation and enhancement for linked data; assignment of identifiers to promote discovery; hosting of digital collections in library repositories; publishing of faculty-edited journals; open access dissemination of research outputs; management of research data; curation of born-digital collections; advice on copyright, digital rights management, and the application of standards; text mining, data analysis, and geographic information systems.

Relatedly, the Open values or ideals are reshaping how scholarship is performed across many disciplinary areas. The Humanities’ response to Openness and digital networked technologies that drive it is largely in the light of the paradigmatic concept of digital humanities (Knöchelmann, 2019) which in principle differs from traditional humanities scholarship in that it often engenders collaboration, it is continuous without the “acceptable stopping point” and is often in the public space (Risam, 2014). Whereas open science is deemed to be a natural habitat of the sciences and thus see it as an approach to leverage digital technologies to further expand and transform science (Knöchelmann, 2020) through open access, collaboration, reproducibility among others. In librarianship, however, with open science, new roles are being created for librarians in order to play active roles in digital scholarship.

Researchers have highlighted the prominent roles of librarians in the research workflow more so in the digital era (Daland & Hidle, 2016). In fact, a critical infrastructure of the Open Science to wit OA, i.e., the Institutional Repository (IR), has been reported to be a service of the library on behalf of the institution to its faculty and staff to preserve their scholarly outputs (Lynch, 2003). Librarians are now even perceived as publishers given the endless capabilities of ICTs as applied to digital scholarship (Canty, 2012; Kolesnykova, 2019; Simser et al., 2015) and leveraging the ideals of DS.

To this end, many libraries in the global North have developed a section of the library devoted to digital scholarship. Although the nomenclature may vary from library to library, yet the services are almost the same. Some of the commonly used names for this new section of library practice are: Scholarly Communications unit or Office of Scholarly Communication, Center for Digital Scholarship, Center for Digital Research and Scholarship, Open Knowledge Center, Copyright and Digital Scholarship Center, Digital Scholarship Services, Scholars’ Lab etc. and created the post of Scholarly Communications Librarian, Open Knowledge Librarian, and Digital Initiative Librarian among others (Been et al., 2016). Similarly, libraries in China are coming up with new specialisations of the practice of librarianship to create new services and sections in support of digital scholarship (Li et al., 2020). This practice is rare in the South especially in Africa where known cases of such specialization is only found, to the best of my knowledge, in one or two South African university libraries. This is not unrelated to the leading role South African institutions are playing in the Open Science movement on the continent.

### 5.1 Some Examples of Libraries Offering DSS

As offering DSS has become a norm in North America and some other parts of the world, there are too numerous cases to cite. But a few will be highlighted below as shown in the University of Houston Libraries' Digital Scholarship Services Team's report (Been et al., 2016, pp. 17–21):

s/n	University	Department name	Services rendered
1	Rice University	Digital Scholarship Services	<ul style="list-style-type: none"> <li>• Open access assistance</li> <li>• Data management plans</li> <li>• Digital Scholarship PROJECT assistance</li> <li>• Scholarly Communication help</li> <li>• Digital research assistance (text analysis)</li> <li>• Digitization and curation</li> </ul> <p><a href="https://scholarship.rice.edu/">https://scholarship.rice.edu/</a></p> <ul style="list-style-type: none"> <li>• Library manages institutional repository</li> </ul>
2	UCLA	<ul style="list-style-type: none"> <li>• Center for Digital Humanities</li> <li>• Scholarly Innovation Lab</li> <li>• Research Commons</li> <li>• Scholarly Communication Services</li> </ul>	<p>Services seem to be spread across multiple departments; not readily identifiable "umbrella." Services found include:</p> <ul style="list-style-type: none"> <li>• Scholarly Communication Services (copyright/open access consulting)</li> <li>• Data management plan assistance (also saw link to DMPTool from their page)</li> </ul> <p><a href="http://www.library.ucla.edu/yrl/scholarly-innovation-lab-sil">http://www.library.ucla.edu/yrl/scholarly-innovation-lab-sil</a></p> <ul style="list-style-type: none"> <li>• Meeting space and digital project assistance (but vaguely described)</li> </ul>
3	University of Virginia	Scholars' Lab	<ul style="list-style-type: none"> <li>• "Project Incubation,"</li> <li>• Open source/access software and project development</li> <li>• Makerspace included in their "umbrella."</li> <li>• GIS/spatial data</li> </ul>

			<ul style="list-style-type: none"> <li>• PRAXIS program; student fellowships teaching them digital tools and scholarship.</li> <li>• UVA Libraries (Research Data Services): StatLab (data and analysis lab; assistance available)</li> <li>• GIS services and workshops</li> <li>• Data management plan consultation</li> </ul>
4	Emory University	Emory Center for Digital Scholarship	<ul style="list-style-type: none"> <li>• EdTech support ("Toolkit" providing information and links to a variety of resources, many freely available online)</li> <li>• GIS &amp; data visualization consultations, classroom instruction, and project partnerships</li> <li>• Statistical data services ("assisting users with locating relevant data and with assembling those data into usable forms")</li> <li>• Training &amp; workshops on data visualization, digital pedagogy, text analysis, blogging, online exhibits, etc.</li> </ul>
5	University of Illinois	Scholarly Communications	<ul style="list-style-type: none"> <li>• Copyright</li> <li>• Research Data Service</li> <li>• Numeric and Spatial Data Services</li> <li>• Digital Humanities</li> <li>• Digitization</li> <li>• Author Rights</li> <li>• Undergraduate Research Usability</li> <li>• IDEALS (Institutional Repository)</li> <li>• Seminars, Speaker Series, Workshops, Classroom instruction</li> </ul>



6	Texas A&M	<ul style="list-style-type: none"> <li>• Office of Scholarly Communication (OSC)</li> <li>• Initiative for Digital Humanities, Media, and Culture (IDHMC)</li> <li>• Map &amp; GIS Library (MGL)</li> </ul>	<ul style="list-style-type: none"> <li>• Copyright and fair use training (OSC)</li> <li>• Promotion of open access journals (OSC)</li> <li>• Digital repository (OSC)</li> <li>• Locate and download GIS data (MGL)</li> </ul>
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**Source:** Been et al. (2016, pp. 17-21).

## 5.2 Imperatives for Nigerian Academic and Research Libraries

There is no denying the fact that the new era of digital technologies is a global phenomenon that leaves no country untouched. Ditto the DS which is dictating the tune of research across the world Nigeria inclusive. Understanding the critical roles the libraries play in the research enterprise, it is needless to persuade Nigerian academic and research librarians to follow the examples of their peers around the world as doing so will make it appear as if the reality of the digital revolution is elusive. It is important to note that there is the need to render dedicated services for libraries to play a role in DS (Been et al., 2016). In agreement with this assertion, the only known study on DSS in Nigeria found that the studied university libraries (45) have skilled ICT staff (37%) and dedicated unit in the library (31%) to support digital scholarship activities. The study revealed further that “digitization and digital preservation, web hosting of digital collections in library repositories and digital content deposit and sharing” are the most popular DSS offered (Gbaje et al., 2020).

The study failed to give clarifications as to what type of unit is dedicated to DSS whether it is existing or new unit and the name by which they are called if any. And is it the same type of unit and naming that is dedicated among the sampled libraries? As per staffing, it is not enough to dedicate “skilled ICT staff” as ICT skills are broad and generally speaking, most library staff of this era have one ICT capability or the other. On the services and tools offered, it appears the universities that participated in this study rely mainly on the institutional repository as the primary digital infrastructure to offer the few DSS. Albeit a good sign of response to digital revolution, this is however far too little compared to the array of digital tools and resources that DSS supports. All these clearly indicated that Nigeria academic libraries are yet to fully seize the opportunities of the digital era and the new normal of DS in particular by aggressively providing the correspondent DSS.

To do this, serious conversations around DS and DSS in the universities and libraries has to commence. This is in agreement with the recommendation that a more aggressive support should be given to open access initiatives in Africa by the core stakeholders such as governments, higher institutions among others (Adegbilero-Iwari et al., 2023). Such conversations should find ways to benefit from the path already charted in North America and China and how these can be localized to suit local realities. But one predominant action taken, be it in American, Canada or China is the reconfiguration or restructuring of library services along creation of new spaces and roles that focus solely on DSS. The names may differ from country to country or institutions to institutions but the services and goals for the unit remain the same. To prosecute DS support, libraries have created units such as: Digital Scholarship Centers (DSC), Scholarly Communications Office (SCO), Open Knowledge Center among others. While different approaches have been proposed in research and practice, it is obvious that, with this kind of establishments, libraries are out to support digital scholarship on their campuses and meet the needs of digital scholars. It is recommended that libraries in Nigeria consider these models and contextualized them for practice. This will not only enhance the maintenance of their relevance in the current age but also serve as an innovative way of rejigging the library services in the light of modern realities in environment of operation and users' needs.

## 5. Conclusion

The paper described the related concepts of digital scholarship, open science and the imperatives on academic libraries to render digital scholarship services. Offering these services will allow libraries to tag along with the prevailing digital networked technologies that have come to define scholarship and scholars in this modern era. Drawing from the historical perspective and definition of scholarship, the paper reported some of the widely accepted definitions of digital scholarship in literature. It cited cases of how research libraries in America in particular and China too have adapted services in support of researchers' digital scholarship activities. Drawing from their approaches, the paper argued that academic and research libraries in Nigeria ought to a cue from these exemplar cases. While noting limited research on the subject in Nigeria, it recommended that scholarly communications unit be created in the libraries to achieve Nigerian libraries' diversification of service in support of digital scholarship and open science taking cognizance of local context.

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