THE ROLE OF DIGITAL LIBRARY PLATFORMS IN SHAPING RESEARCH PRODUCTIVITY TOWARDS A PRODUCTIVE RESEARCHER

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Abstract
Research has always been a complex task, often overwhelming due to managing multiple projects and prioritising tasks. Historically, researchers relied heavily on physical libraries and extensive manual searches. The shift to digital libraries marks a significant transformation, enabling more efficient access to resources and tools for organising information. Digital library platforms streamline research by offering easy access to e-books, e-journals and multimedia content, along with advanced features like personalised recommendations and collaborative tools. This paper classified them into open-source and commercial solutions, each with its own strengths in managing digital content. These platforms have redefined research productivity by enhancing information retrieval, citation tracking, and plagiarism detection. However, they come with challenges, such as technological dependencies, financial constraints, and issues around copyright. Despite these hurdles, digital libraries play a central role in modern research, supporting open-access initiatives and improving the visibility and impact of academic work.

Keywords: Digital, Library, Platform, Productivity, Research

Introduction

Conducting research is a demanding endeavour, and many scientists often find themselves managing multiple projects simultaneously. This can lead to overwhelming feelings, resulting in moments where one might find themselves staring blankly at a to-do list, uncertain of which task to prioritise next. In such situations, it is common to default to less critical tasks or engage in procrastination, which subsequently diminishes productivity (Enago, 2020). According to Syed, (2019), a truly productive researcher is one who sustains high levels of productivity consistently over time. These researchers excel in managing their tasks, maintaining organisation, and making steady progress on complex projects.

Digitisation according to Dominik, (2022) refers to the pure conversion of analogue to digital data. This enables cost reductions, unlimited reproducibility, worldwide distribution within seconds, machine-evaluation, or further machine-processing. Thus, digitisation of analogue

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information leads to profound changes, which are reflected in the use and application of information and communication technologies, changed business models, as well as in the organisation and in the processes of companies and institutions.

Digital library platforms, as described by *Brueck et al.,* (2019), are powerful tools designed to provide easy access to a diverse range of digital resources, such as e-books, journals, and multimedia contents. These platforms offer more than just access; they also provide efficient tools for organising and categorising content through metadata, which enhances users' ability to search and understand the resources within a broader context. Additionally, these platforms often incorporate advanced features such as personalised recommendations, collaborative tools, and interactive elements like virtual tours, enriching the user experience and promotion greater engagement with digital content (Ashikuzzaman, 2023).

Digital library platforms can be classified into open-source and commercial solutions, as noted by Timotheou *et al.,* (2023). Among the open-source options are DSpace- a flexible platform for managing digital content; Greenstone Digital Library- which allows for the creation of custom digital libraries; EPrints- designed for institutional repositories of research outputs; Digital Commons- supporting scholarly communication; and Islandora and Samvera- which offer robust digital asset management features through the Fedora Commons framework.

On the commercial side, platforms include Polaris ILS- which provides integrated library services; Follett Destiny Library Manager- known for streamlining library operations; Ex Libris Alma, a cloud-based solution for academic libraries; SirsiDynix Symphony- a popular integrated library system; Springshare- offering tools for research guides and library websites; and Hoopla- a digital media service that allows users to borrow a wide range of content through public libraries, with the convenience of syncing across devices.

The concept of "research productivity" merges the ideas of "research," which refers to the systematic investigation of phenomena to uncover new insights, and "productivity," which relates to the amount of work produced over time. In higher education, research productivity is often demonstrated through the publication of articles in academic journals, the release of books, or the presentation of papers at conferences (Alemu, 2023). Publications are widely recognised in the literature as a key measure of productivity, reflecting a researcher's dedication and serving as the main channel for disseminating findings to the scientific community (Simisaye, 2019). This emphasis on research and publication drives knowledge advancement, leading to discoveries that benefit society.

When considering highly productive researchers, a key question arises: can they sustain their high levels of productivity over time? According to findings by Marek and Wojciech, (2024), about half of the most productive assistant professors maintained their productivity as they advanced to associate professor roles, and similarly, half of the top associate professors continued to be highly productive as full professors (52.6% and 50.8%). Interestingly, neither gender nor age, whether biological or academic, significantly influenced these outcomes. These results have important implications for hiring practices, suggesting that the productivity levels of scientists at the time of hiring can have long-term effects on institutions and national science systems, given that academic scientists often remain active in the system for many years.

Research Before the Age of Technology

Despite the convenience of modern tools like Google, sourcing relevant information for a literature review can still be a time-consuming task. Reflecting on this, it's intriguing to

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consider how researchers in the past managed such challenges without the internet, relying on extensive reading to uncover specific details. This comparison stresses the importance of the resources available today, as Grant, (2019) rightly noted, libraries subscribed to several services that surveyed literature, provided abstracts, and cross-indexed primary journals. Among these were the Science Citation Index and Science Abstracts, the latter having been published since 1898. These services were available in large, heavy print volumes that occupied considerable shelf space and represented a significant portion of the library's budget.

Footnotes have long been valuable for tracing the origins of ideas, forming a backward-looking reference trail. In the 1960s, computers were first used to reverse this process by sorting approximately 20,000 footnotes from professional journals. This innovation enabled researchers to track the progression of ideas forward in time, creating a new way to understand the evolution of scholarly thought (Walter, 2019).

Before the internet, conducting research and retrieving information was a much more laborious task. Libraries, encyclopaedias, and books were the main sources of knowledge, requiring students to spend countless hours searching through card catalogues and library shelves to find relevant materials. Encyclopaedias like the *Encyclopaedia Britannica* were commonly used for general knowledge, but they were limited in scope and often outdated. Unlike today's instant access to online databases and search engines, finding specific information back then demanded considerable time and effort (Josea, 2023).

In early 1967, during his first year as a graduate student, Andreas became curious about measurable cardinals but struggled to find a definition, as he recounted (2019). It wasn't until several months later, when Joe Shoenfield's book *Mathematical Logic* was published, that he finally found the information he was seeking. Although Dana Scott had published a paper on measurable cardinals and constructible sets years earlier, Andreas was unaware of it at the time. Graduate students heavily relied on libraries and librarians, often spending hours in the academic library's math section, moving from book to book and taking extensive notes on paper, as described by Buffy (2019). However, when a needed resource wasn't available in the library, they would request a loan from another institution. Librarians were also valuable as 'knowledge experts,' offering suggestions and guidance on where to find relevant materials—a skill Buffy wondered if modern librarians still possess. Additionally, students would often seek advice from colleagues on where to uncover the most valuable resources.

Digital Technology and Research: The Modern Era

The advent of digital technology has dramatically transformed research. Small innovations, like digitised finding aids, database searches, and smartphones in archives, have collectively transformed how researchers conduct their work. Much like the frog that fails to notice gradual changes in its environment, researchers may not fully grasp the extent of this transformation. Today, our research practices are deeply integrated with digital tools (Royalhistsoc, 2022). According to Haleem *et al.*, (2022), technological advancements have given rise to online libraries, eliminating the need for physical space and fostering global interaction among students, teachers, and researchers. Online forums have also enabled subject experts to collaborate on curriculum evaluation, teaching methods, and assessments. By reducing paper use and increasing the efficiency of research, digital learning promotes sustainability, cuts costs, and enhances the reach and impact for both students and researchers.

Digital technologies, tools, and services serve multiple roles in research—they can be the subject of study, tools for creating new methodologies, and the environment where research

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takes place, as highlighted by Tsatsou (2016). Depending on how the internet is used or perceived in a research project, different epistemological, logistical, and ethical issues arise. Digital research often involves investigating digital spaces like blogs, social networks, or virtual communities, developing methods using digital tools, and sourcing data from online platforms. These technologies can simultaneously shape research design, data collection, and analysis.

The Different Ways Digital Technologies has Changed Research

Information Search and Retrieval: Slamecka, (2024) observed that the 1990s brought a major advancement in information retrieval, as computer networks enabled users to simultaneously search multiple databases across various locations using standardised protocols. This shift laid the groundwork for the extensive use of online information resources, as noted by (Muhammad and Shakeel, 2022). Today, researchers benefit from easier and more effective access to data through online public access catalogues, digital libraries, e-databases, e-journals, and other online repositories, which are now widely utilised by students, faculty, and research scholars.

Scientists' long-held desire for immediate access to scientific literature has become more achievable with advances in network information systems and digital libraries. Although the core challenges of information retrieval have remained largely unchanged, the Internet has expanded access to literature searches for a wider audience. Digital libraries facilitate searching across extensive electronic collections, moving beyond simply digitised repositories. Historically managed by professional librarians, these searches are now increasingly conducted directly by scientists. The future of information retrieval is shifting towards semantic search technology, which will enhance the ability to search based on concepts rather than just keywords (Bruce, 2024).

Paraphrasing: Paraphrasing plays a vital role in academic and professional writing, allowing writers to rephrase ideas from credible sources, thereby establishing their own credibility and showcasing a deep understanding of the material (Young, 2024). Paraphrasing tools, as explained by Flyingvgroup, (2024), offer a streamlined way to achieve this by using advanced digital technology to rewrite content while preserving its original meaning and context, making the process as natural and seamless as if done by a human writer.

Plagiarism Check: Plagiarism is a common issue among students and professionals, often driven by time constraints and the perceived ease of copying others' work. A study by the International Center for Academic Integrity found that 62% of 71,300 undergraduate students and 40% of 17,000 graduate students admitted to cheating in their papers (Copyleaks, 2019). This widespread problem extends beyond academia into the workplace, involving not just text but also images, ideas, and other people's work without proper credit. To address this, plagiarism-checking software such as Turnitin and PlagTracker scans documents against billions of webpages and academic databases, making it easier to identify copied content and improve citation practices (ScoreDetect, 2024).

Citation Tracking and Referencing: Citation tracking, also known as citation analysis or cited reference searching, is a method used to evaluate the impact of research by counting how often a study or author is cited in other works. This process helps identify influential scholars and assess the significance of a study by examining the frequency and context of its citations, as well as the disciplines of the citing authors (University of Southern California Library, 2024).

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To enhance citation and referencing accuracy, numerous digital tools have been developed. Many word processors, such as Microsoft Word and LibreOffice, come with integrated citation features. Standalone software like Citavi, Endnote, Mendeley, Zotero, ReferenceManager, ProCite, BibTex, and Perrla, along with digital platforms like Academia.edu, Google Scholar, Web of Science, ResearchGate, and PLOS Impact, offer specialised citation support (Dunlop, 2019). These tools differ in cost and accessibility, with some being free and others requiring a subscription, and can be used both online and offline.

Digital Object Identifier (DOI): The Digital Object Identifier (DOI) is a system designed to uniquely locate and link to digital information published online, often referred to as "the bar code on the Internet". This system provides a permanent internet link to electronic journal articles and offers comprehensive services including registration, analysis, and citation linking. Widely adopted by international publishers like Elsevier, Springer, and Wiley, DOI is well-established in sci-tech journals abroad. However, its use in domestic contexts is still in the early stages (Dai, 2015).

According to York, (2024), A Digital Object Identifier (DOI) provides a unique and permanent link to a resource, ensuring its long-term accessibility and citation. Typically assigned to academic outputs such as journal articles, books, and datasets, a DOI directs users to the specific URL of the resource. This system not only aids in locating and citing work but also assists with citation tracking.

Institutional Repository: An institutional repository is a digital archive that centralises, preserves, and provides access to an institution's intellectual output, such as research papers and theses. These repositories enhance institutional visibility and reputation while offering scholars broader dissemination, increased use, and greater professional visibility for their work. By making scholarly outputs accessible online, they play a vital role in promoting and preserving academic research (CARL, 2024). Among the various software options for implementing such repositories, open-source solutions like EPrints (http://www.eprints.org) and DSpace (http://www.dspace.org) are gaining popularity both nationally and internationally due to their straightforward implementation compared to other available software.

Open Access Initiative: Open Access (OA) essentially means free access for users, often referring to documents available on the web, also known as public domain documents. This term is commonly associated with scholarly material, meaning that electronic scholarly articles are available freely at the point of use. OA is a recent movement in the communication of scholarly research, where neither readers nor their institutions are charged for access to articles or other resources. OA is also known as open-access publishing and free online scholarship (projectsxtra.com, 2024).

Academic institutions are increasingly adopting institutional digital repositories as part of the open-access model, which supports immediate access to peer-reviewed research and enhances scholarly quality. In Japan, universities are encouraged to develop these repositories to boost knowledge sharing globally. Open access (OA) not only raises university profiles and visibility but also reduces journal costs and advances the mission of knowledge dissemination. OA broadens the reach of research, integrates local studies into global networks, fosters collaboration, and strengthens national science bases, aligning with higher education's goal of advancing knowledge (Musa & Kabir, 2017).

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Challenges Faced by Researchers

While digital library platforms provide numerous advantages, they also present challenges. Ashikuzzaman, (2023) highlighted concerns such as the heavy reliance on technology, which can result in server outages, connectivity issues, and data loss, disrupting access. Additionally, not all resources are available digitally, and the authenticity of online sources can be compromised by misinformation and plagiarism. The digitization process itself is expensive and time-consuming, requiring considerable expertise. Moreover, copyright restrictions and licensing agreements can further limit access and usage of digital materials.

Rahmani, (2022) identified several challenges faced by digital library platforms, including financial constraints that limit their development and upkeep. There are also difficulties in securing specialised human resources necessary for effective management, along with issues related to digital equipment and internet infrastructure, which can impair accessibility. Additionally, concerns over copyright, intellectual property, and the security of digital resources are significant, as is the ongoing need for proper protection and maintenance of these resources.

Conclusion

Digital library platforms have significantly transformed research productivity by ensuring seamless access to information, organising resources, and facilitating the dissemination of scholarly work. These platforms provide essential tools for citation management, plagiarism detection, and efficient data retrieval, making them important to modern research practices. However, this shift towards digitisation comes with its challenges, including technological dependencies, financial limitations, and issues related to copyright and intellectual property. Furthermore, the need for specialised human resources and robust infrastructure remains a concern. Despite these obstacles, the advantages of digital libraries in enhancing the visibility and impact of academic work are evident. They align with global initiatives like open access, which promotes broader dissemination and collaboration. As institutions continue to embrace these technologies, addressing the challenges associated with digital library platforms will be crucial to ensuring their effectiveness and sustainability in supporting academic excellence and advancing the mission of higher education.

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