

Contemporary Academic Research and the Challenges of the Digital Era

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Abstract—Academics world-wide value the tasks of research and writing as ways of making valuable contributions to their fields of study. Universities also benefit greatly from their active researchers by gaining an increased research profile and they therefore establish mechanisms to support productive research. However, the traditional structures to support and guide academic research have been disrupted by the introduction of a large variety of digital aids to research. Despite the huge benefits of digital supports, most of them do not embrace the traditional research infrastructure systems of universities. Moreover, the traditional publishing processes which once provided universities with control over the research quantum have been replaced by a plethora of seemingly official, seemingly genuine research journals, many of which are fake and are set up to harvest exorbitant payments from unsuspecting research authors. This paper explains some of the challenges of digitisation to the research process and proposes responses to them.

Keywords—digital aids to research; research publication; open access publishing; predatory journals; management of research.

I. INTRODUCTION

Research is essential to a better world. We depend upon the creative, innovative activity of committed researchers to lead us to a more sustainable, compassionate and just society in a more balanced and harmonious world. Yet the normal and traditional research process is under serious threat. Technology threatens to disrupt the research process in a way we have never experienced before. We need to ask the question: have universities lost control of the academic research process?

Let's first consider the role of universities in the community. Universities have been established in every society to create and disseminate knowledge. Universities are independent of government and are expected to be places where freedom of speech and freedom of expression are permitted and where objective research is conducted [1]. Research is a vital and dominating part of the role of universities within the community in the creation of knowledge. The community depends upon universities to stimulate, encourage, monitor, stabilise and manage the strategic research of a nation [2],[3]. Moreover, the research communities within mainly the university sector have acted as the gatekeepers of knowledge. Research has, over centuries, contributed to the amassment of a research quantum made up of research findings and theory against which all new pieces of research have been measured and compared.

Now we witness the impact of ever increasing digitisation upon every aspect of the research process to bring about dramatic changes to the entire research landscape.

II. THE IMPACT OF DIGITISATION UPON THE RESEARCH PROCESS

There are many aspects of the research process that are able to be assisted or facilitated by digitisation.

A. Establishing the Research Process and Forming Research Teams.

As communication technologies are made more mobile and accessible to people, the capacity to communicate more quickly, certainly, immediately and securely has transformed the sharing of research information across teams and sped up the research process from research design phase to publication phase. Email, sms, and social media have progressively revolutionised the sharing of information and accelerated the decision-making processes in research design and analysis.

B. Reviewing the Research Literature.

Searching, filtering and scanning of the research literature has been immensely helped through the provision of search engines like Google and Google Scholar and repositories of information like Wikipedia and source management tools like Endnote.

C. Selecting Samples, Ensuring Randomisation, Tracking Cases, Selecting Appropriate Measures or Tests, Collecting and Storing Data and Ensuring Ethical Collection and Aggregation of Data.

Each of these processes is able to be assisted by the use of digital tools of various kinds from Google Docs to Dropbox.

D. Submitting Papers for Publication

Most journals insist upon digital upload of submitted articles and some use an independent agency to receive, review and communicate with authors like Open Journal Systems. Bibliometrics assist in measuring the quality and impact of journal articles in comparison to others.

Universities and national departments of higher education have embraced bibliometrics – the statistical study of research quantum – after decades of debate [4],[5]. There has been a need to objectively quantify research achievement so that research funding allocations may be made more fairly.

Research writers themselves agree that research productivity needs to be measured in a universal manner [6]. Bibliometrics is the statistical analysis of bibliographies and Scientometrics is the study of the spread of ideas particularly through citations [7]. Most citations come from articles from high impact journals [8]. Altmetrics is the study of the spread of ideas through analysis of social media such as blogs, Twitter and Mendeley [9].

There are a number of observations we can make about the proliferation of digital tools that have been developed to support the management of research activities. In the first place, these digital tools provide valuable support to authors who often struggle to find a way through the highly complex pathways of research and publication [10]. These tools are accessible, individual, usually free and often provide excellent guidance. They supervise the research process and ensure that nothing is forgotten. They manage data and data storage and analysis. They lead the researcher to the most recent specialised literature necessary for high quality examination of a research topic. Some of them even assist in the writing of grammatically correct English.

But these tools are digital, not personal. They are based on mechanistic alpha-numeric data rather than verbal or conceptual data. They offer advice according to predetermined algorithms. Universities, on the other hand, are based on the student-teacher or researcher-mentor or advisee-adviser model of human interaction. Universities manage their teaching of research methodology through the establishment of relationships between experienced and newer researchers. The guidance provided to newer researchers or higher degree candidates is customised, individualised and personalised. It is broader than the observance of investigative protocols or the aggregation of manipulable data. It is instead, conceptual and philosophical and deliberately interactive. The increased use of digital research management tools jeopardises the personal customised service of the traditional university research advisory system. It is clear that digital research tools should never be considered an adequate substitute for the personalised service of the university mentor.

III. THE LABYRINTH OF PUBLICATION

Publication of research has been traditionally claimed by universities or professional associations and older universities set up their own publishing companies like Oxford University Press (OUP) or Melbourne University Press (MUP). Non-university sector commercial academic publishing companies were also established which focussed more of the mass publication of books and school books. These publishers attempted to form strong links with university researchers in order to maintain high academic quality and to provide valuable endorsement for their publications. Commercial publishers were more focussed upon profit making and marketing than their university collaborators. They produced books or journals using a strong network of university advisers and peer reviewers drawn from university faculties. As competition intensified the commercial companies began to form publishing

conglomerates such as Taylor and Francis, Reed-Elsevier, Wiley-Blackwell and Springer. They set up special arrangements with a number of universities, research institutes and professional associations to undertake the publishing process for them in return for fees they charged to readers for the download of articles. The motivation for publication by these publishing companies has become profit-making and this has been cemented by the creation of monopolies and exclusion of non-paying readers.

In response to the over-commercialisation of research publication, there has, therefore, been a campaign among universities to encourage what is known as “open access publishing”. Open access publishing is the provision of publications to any reader without cost and sometimes with a full licence to reproduce an article. It generally includes only fully peer reviewed articles. Most researchers have welcomed open access publishing because their ultimate aim is to make their research articles available to as many readers as possible – thus enhancing the chances that their work will be cited. This movement was formalised in the early 2000s when international groups of universities made an agreement on the guidelines for open access [11]. Now more than 50 per cent of journals quoted in research come from open access publications and repositories of open access content. Some authors refuse to publish in journals that are not open access journals. There are various levels of open access, some requiring an author article processing charge (APC) and now, even some of the big commercial publishers make some publications available through open access. There is a growing number of repositories of open access materials [12].

Accompanying the global digital revolution has been the rapid expansion of the tertiary sector in the non-western hemisphere. There has been exponential growth in the number and size of universities particularly in Asia, the Middle East, South America and Africa and the quality of research from these regions is fast improving. Because universities are judged on the basis of the quality of their research output [5],[13],[14], there is a need for this newer university sector to develop and rapidly expand its research quantum [3]. There is consequently a need for many more research publications, and, along with them, peer reviewers and journal editors. This has helped to create a new industry in the establishment of new journals and books (particularly online).

The exponential growth in the number of journals has seen the introduction a certain number of fake journals (sometimes referred to as rogue or predatory journals). Now in the digital era, almost anybody or any organisation can establish a journal or publish a book online with no requirement to meet any publishing standards or follow ethical protocols. A librarian from University of Colorado, Jeffrey Beall, published a list of predatory journals in 2008 which was later removed from the internet in 2017 because of the threat of legal action. Beall's List was republished by other institutions and contains more than 10000 predatory journals. Predatory journals are invariably open access online journals that charge a high fee to authors to ensure publication, promise peer review, boast high

impact factors and guarantee faster publication times. They attempt to mirror high quality journals. Approximately 35 per cent of predatory journals originate in India and a further 25 per cent in other parts of Asia. Because these fake journals are publicly known, there is a danger that authors who claim publications in predatory journals in their CVs, may make themselves less employable in high quality research institutes and universities.

IV. DISCUSSION

Technology is a major disruptor of seemingly well-established permanent practices and current cultural forms. While technology may make insignificant contributions or alterations to a process, the potential outcomes and consequences of technological change may be extraordinarily significant. This is mainly because technology has the capacity to alter the way we think about or approach an action. The technology in and of itself does not bring about cultural change, the people who use it bring about that change. If a desired action or process is able to be performed more easily, better, faster or with fewer negative side effects, people are keen to adopt that method of expediting an action. We seek improvement and development not just to give ourselves a competitive edge but also to improve the ease and convenience of an action. The digital era has thus transformed the conventional research process.

There are a number of outcomes to these digital disruptions to the research process. The increasing digitisation of the research process replaces much of the responsibility of university research staff in leading the research learning of newer researchers. Amongst other things, digital technologies assist newer researchers to structure the research process, scan the research literature, assemble, control and maintain literary resources, design research problems, establish a research plan, select research instruments, select cases, objects, materials or respondents, collect and aggregate data, analyse data and construct a plan for reporting research. Digitisation has the capacity to replace many of the tasks of the research adviser/supervisor in guiding the work of a student advisee/higher degree candidate. These factors illustrate the way digitisation may impact the role of universities in maintaining the quality of research procedures and control the training and development of newer researchers.

Digitisation has the power to weaken the control universities exert over the research literature. The proliferation of newer journals and digital books has rapidly expanded the research literature. The addition of thousands of newer journals to the research literature and the expanding number of peer reviewers and journal editors has made it impossible for universities to exercise control over the literature. Newer methods of assessing the quality of journal articles through journal metrics, citation indexes and impact factors has tended to weaken the need for traditional peer review processes of conventional publishers. The research quantum in itself is less clearly defined.

Digitisation has enabled the emergence of a multiplicity of predatory publishers which seek out unwitting researchers to

publish their work with little or no peer review and rapid publication turnarounds. Although there have been a number of effective attempts to halt predatory publishing, it still has the capacity to add a large number of (possibly poorer quality) research publications to the research literature. The boundaries between legitimate and illegitimate publications have become blurred.

Peer review has conventionally been the method for checking the quality of new research which has been submitted for publication and it is through this means that the suitability of a research topic and the adequate application of measure for controlling validity of research outcomes are made. With the breakdown of normal peer review processes in a huge number of newer research publications, the research quantum is changing to a more varied collection of articles. In my opinion, with fewer controls over research topics we may be faced with a dilution in the quality of the application of theory to practice, a reduction in discussion of theory, an increase in positivistic research and an emphasis upon quantitative over qualitative research.

Digitisation has the capacity to increase and improve collaborative team work. The literature shows that the growth of collaborative research globally has been dramatic and may have been fanned by a number of factors. An increase in institutional funding for research in itself has been important [15] in stimulating greater collaboration but this has been accompanied by the rise in the use of communication technologies as a means of facilitating communicating between people in different institutions as well as different countries [16] and the greater acceptance of English as the language of international publication. A number of studies have concluded that collaboration, because of the very nature of mutual or team work, enhances the production of new knowledge [17],[18]. It confers a certain amount of status upon collaborators in enhanced academic reputation [19] and results in an increase in the number of citations [20],[21] with even more citations if the work is international. Participants in collaborative projects also find that they are more likely to be further linked into other academic networks [22].

Universities are responding to these dramatic changes in the research landscape and adjusting to the shifts in control and management of research. Universities are judged against objective and transparent measurement criteria and they therefore need the cooperation of staff and higher degree students in correctly collecting publication data. They are bound by government guidelines in reporting active research and are rewarded in terms of prestige and acclamation in the university sector and publicly for expanding their research quantum. In most places, research funding from government sources increases with an increase in research quantum. Some university functions are particularly challenged by the increasing digitisation of research processes. Graduate schools need to keep abreast of changes to the availability of new digital developments and they need to revise their higher degree teaching programs to reflect these changes. Universities need to attend to the way they build relationships between

experienced/neophyte and adviser/advisee researchers. They need to create the research environment which encourages mentoring and collaboration in research.

University libraries are particularly vulnerable to the impact of digitisation upon the provision of services. With the massive switch to digital resources in libraries, the dramatic reduction in hard copy books and periodicals and the greater pressure upon librarians to service the needs of readers in traversing the online indexes and repositories, there are implications for staffing of libraries and training of librarians. One day, university libraries may be bookless (with the exception of historical collections)!

V. CONCLUSION

Digitisation of the research process provides a myriad of benefits and advantages to the researcher-author. It offers planning and organisational tools, search and sort functions, data management and analysis tools, integrating and writing tools and publishing tools. However, it also challenges the very role of universities in overseeing the introduction of new research findings to the amassed collection of verified research and theoretical data. It promotes the individual research journeys of researchers despite the corporate research oversight responsibilities of universities themselves. It promotes a research culture that is individual and personal and is virtually uncontrollable. Digitisation challenges the very role of universities in the creation, management and dissemination of knowledge.

The new era in digitised research publication is also a challenge to governments whose ministries of higher education worldwide look for ways to standardise the control of research publication despite the emergence of a plethora of avaricious profit-driven academic publishers. They need to do more to protect the quality of the major university-based publishing enterprises and the quality of the articles published in them. They need to guard the peer review process because it is the primary way newly submitted research may be judged against the universally accepted research literature. Departments of higher education have a changing role in managing and encouraging the research sector.

Research is essential to human wellbeing. It needs to be open to intense expert scrutiny through the peer review process and the rigours of the publication process. It is also the marker of university quality and the measure of universities' contributions to the community. Where digitisation of the research process allows the measures of research quality to be properly applied, it becomes an invaluable partner in the production of knowledge and the progress of the community.

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