**Learning analytics in Open Universities in the Commonwealth: an unrealised dream?**

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**Abstract**

Since the emergence of learning analytics, much of the research has emerged from traditional campus-based institutions in the Global North (Prinsloo, 2018, 2020). While learning analytics is not a panacea for all of the challenges faced within distance education with regard to, for example, student retention and throughput, there is evidence that it may impact positively on course design, pedagogical strategy, student support and a deepening of the student learning experience (Blumenstein, 2020; Ifenthaler & Yau, 2020).

This paper reports on the findings of a bibliometric analysis of the state of learning analytics research in 27 Open Universities in the Commonwealth. It confirms that the majority of research is from Open Universities in the Global North. The seeming absence of published research from the Global South raises a number of questions. The paper concludes with observations and pointers for future work.

**Introduction**

Open universities, by dint of their openness, can face additional challenges pertaining to student success and student dropout (Kember, Leung & Prosser, 2021; Mashile, Fynn & Matoane, 2020; Sanchez-Elvira Paniagua & Simpson, 2018). Not only do they offer access to those students unable to access other forms of (higher) education, but their students are often in need of more personalised support (Daniel, 2019; Simpson, 2006; Subotzky & Prinsloo, 2011).

Learning analytics has a proven track record in provision of personalised support, identification of students-at-risk and for increasing the effectiveness of pedagogical strategies (Lim, Gentili, Pardo, Kovanović, Whitelock-Wainwright, Gašević & Dawson, 2021) and appears to be particularly suitable for open and distance learning institutions. Despite its potential, little is known regarding the extent to which open universities within the Commonwealth employ learning analytics.

Determining the use of learning analytics among open universities is challenging, given different levels of digitisation and datafication (Prinsloo, 2020); asymmetries between the Global North and the Global South in scholarly publications and collaborations (Guzmán-Valenzuela, 2019); languages in which research is published; and the interchangeable use of learning analytics (LA) and educational data-mining (EDM) to describe the use of institutional data.

**Learning analytics and educational data-mining: overlaps and differences**

A recent paper by Prinsloo and Kaliisa (2022) explored the state of learning analytics research on the African continent in the light of little evidence of published peer-reviewed scholarship, and a lack of registration for the annual Learning Analytics and Knowledge Conference. The authors speculate that one possible reason is that LA remains a largely emerging field on the African continent and is not yet seen as distinct from EDM. Ferguson (2012) differentiates between the two as follows: “Educational data mining (has) focused on the technical challenge: How can we extract value from these big sets of learning-related data?” while LA has “focused on the educational challenge: How can we optimise opportunities for online learning?” (p. 3011).

Siemens and Baker (2012) agree that EDM and LA have "distinct research communities" (p. 252). They propose that "it is important for researchers and educators to recognize the unique attributes of each community" (p. 252).

In practice, things are not altogether clear. Dos Santos, Cechinel, Nunes and Ochoa (2017) confirm that the occasional interchangeable use of terms, though their mapping of the state of LA research excludes variations of EDM within their search terms. In contrast, Maphosa and Maphosa (2020) researched EDM in sub-Saharan Africa, and in their systematic review used the search terms "educational data mining" OR "learning analytics" OR "academic analytics" AND ("Africa" OR "developing countries"). The broad consensus seems to be that, given a lack of evidence of LA in much of the Global South, LA practices and its adoption may acceptably be described as EDM (Botha & Vilyte, 2021; Lemmens & Henn, 2016).

**Approaches for mapping the field of learning analytics in the Commonwealth of Learning**

Map-making has been part of our lives for thousands of years, from early Babylonian clay tablets, the mapping of stars to aid navigation, and the increased importance of maps in the 'Age of Discovery' from the early 15th century through to the 17th century (Leca, 2017). Although inherently practical aids, we should also the role of maps in notions of 'discovery' of new lands in serving the interest of colonialism, genocide, and slavery. Maps, and map-making should therefore also be understood as political, serving the interests not only of the cartographer, but also those who employ the cartographer (Bauman, 1998).

Mapping a disciplinary field or published research findings will also serve a variety of interests, for example, providing information on the growth or decline of an academic tribe (e.g., Becher Trowler, 2001) or topics, and how institutions and authors participate and contribute and collaborate together, etc.

Literature reviews can take many forms, and in the context of mapping an academic field, most often include systematic and scoping reviews, meta-analyses and bibliometric analyses (Grant & Booth, 2009; Munn, Peters, Stern, Tufanaru, McArthur & Aromataris, 2018). While it falls outside of the scope here to provide an overview of these approaches, it is important to note that each provides an overview of the 'state' of a field or research focus, and has a well-defined focus and methodology.

Bibliometric reviews are useful "for deciphering and mapping the cumulative scientific knowledge and evolutionary nuances of well-established fields by making sense of large volumes of unstructured data in rigorous ways" (Donthu, Kumar, Mukherjee, Pandey & Lim, 2021, p. 285). As such these reviews provide a "one-stop overview" that can help to identify gaps in current understandings of a phenomenon, stimulate new ideas, and allow scholars to "position their intended contributions to the field" (Donthu et al., 2021, p. 285).

One example of a bibliometric analysis reporting on the state of LA (research) is that of Waheed, Hassan, Aljohani & Wasif (2018). Of interest for this paper are the authors' desired outcomes which included: a quantitative study of "the multidisciplinary field of learning analytics over time, in terms of publication and citation counts; … identify those institutions and countries dominant in the field; … [and] study collaboration network patterns with respect to institutions and authors" (p. 942). Bibliometric analyses often have a specific focus; for example, a defined period, e.g., the last decade (Azevedo & Azevedo, 2021), use of a particular database, e.g., the Web of Science (Talan & Demirbilek, 2022), a specific context, e.g., higher education (Zhang, Zhang, Jiang, Ordóñez de Pablos & Sun, 2018), certain journals or conferences (Baek & Doleck, 2020), or a geographic context, e.g. Africa (Tlili, Altinay, Huang, Altinay, Olivier, Mishra, ... & Burgos, 2022).

Initial searches suggest that there is no known research on the state of learning analytics research in the Commonwealth in general, or on the state of learning analytics research in the context of the open universities in the Commonwealth. This paper reports on the findings of a bibliometric analysis of the state of learning analytics research in the 27 Open Universities in the Commonwealth (Mishra, 2017).

**Methodology**

According to Donthu et al. (2021) techniques for bibliometric reviews "manifest across two categories: (1) performance analysis and (2) science mapping. In essence, *performance analysis* accounts for the contributions of research constituents, whereas science mapping focuses on the *relationships between research constituents*"

(p. 287). Performance analysis therefore includes metrics such as the total number of publications; the number, affiliations and identities of contributing authors; sole or co-authored publications; and publication trends; etc.

*The aims and scope of the bibliometric analysis*

The purpose of this bibliometric analysis is to determine the state of learning analytics research in 27 of the Open Universities in the Commonwealth (Mishra, 2017). (See Appendix A).

*Techniques for the bibliometric analysis*

Two databases were selected for this bibliometric analysis, namely Scopus and Web of Science (WoS) (all indices from 1972). The search strategy used was as follows:

1. "Learning analytics" AND each of the universities (searched as affiliation and not keyword)
2. "Educational data mining" AND each of the universities (searched as affiliation and not keyword)

Searches were undertaken on the two databases on the 27th of March. Quotation marks were used around key phrases to ensure that retrieved results included all words in that specific order. Phrases were searched in the title, abstract and keywords fields for both Web of Science and Scopus.

An advanced search was used to retrieve the results in Scopus which provided a unique number for each university (Affiliation ID) ensuring that all variant university titles were included as part of the search. The Topic field was used for Web of Science so that only author keywords and keywords plus field were included.

*Collect the data for the bibliometric analysis*

The search results from each database were exported to Excel, consolidated and duplicates removed. References were also marked as found in both Web of Science and Scopus, in Scopus only and in Web of Science only. The affiliation data was cleaned up to reflect the 27 universities of interest.

**A bibliometric analysis, findings and summary**

Figure 1 shows the number of identified papers. As might be expected, publications first appeared in 2011 following the formal introduction of LA in that year. Other EDM-related papers may have existed before this, but none were found linked to the 27 universities here. It is interesting publications appear to peak in 2017 given the continued (and growing) prominence of LA research. This may reflect movement of researchers from open universities to other higher education institutions. Note that papers recorded for 2022 are likely to increase.

**Figure 1**
*Breakdown of the number of papers (LA and EDM) per year*

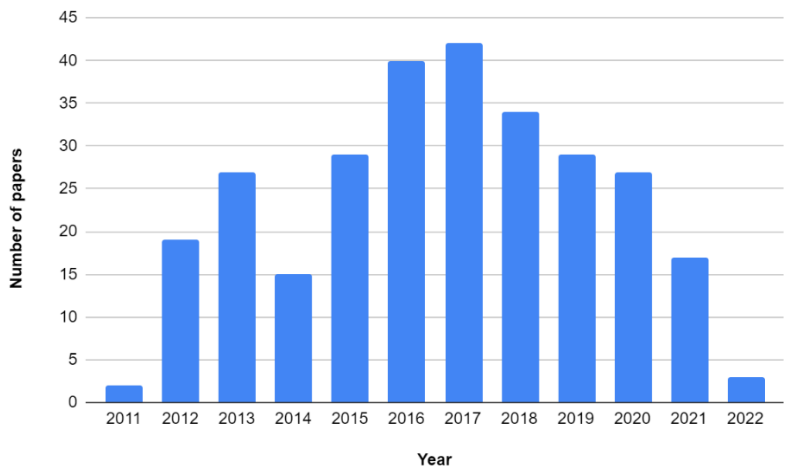


Figure 2 below shows a breakdown of the proportion of publications per Commonwealth open university, and Figure 3 illustrates the number of publications by country. Joint publications are counted against both institution. Although the universities within the three largest segments have established track records in learning analytics, the extent to which they dominate the field is a little surprising, accounting for 98% of retrieved publications.

**Figure 2**
*Number of papers per institutions*

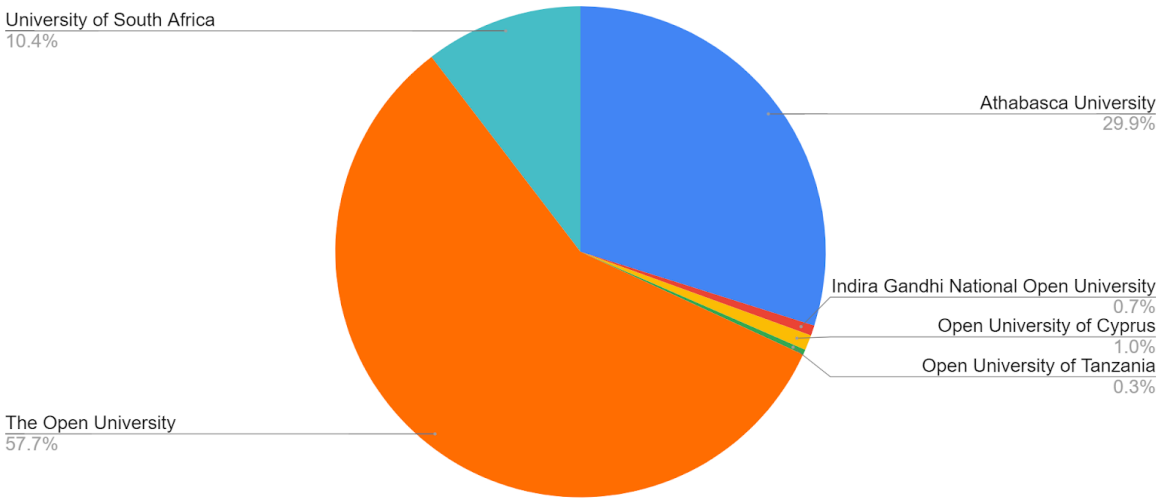
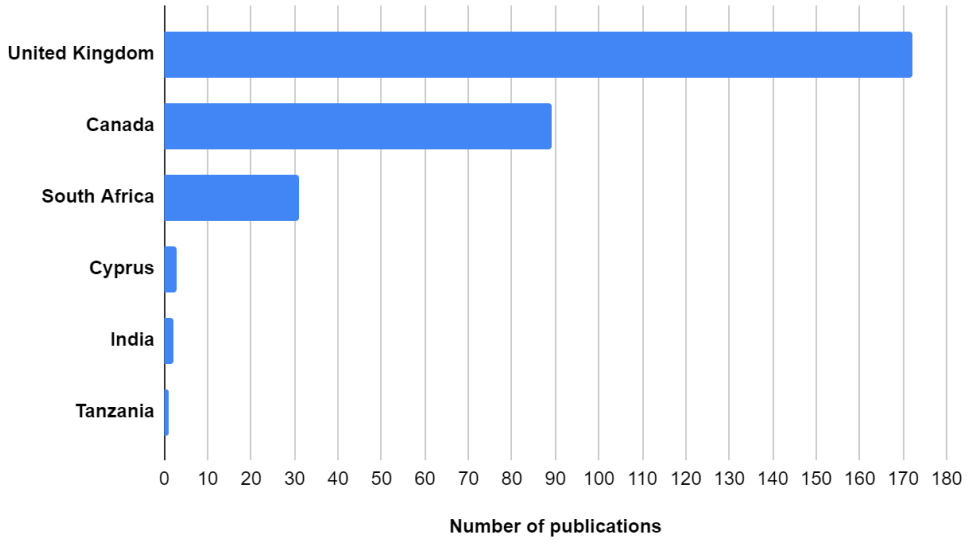



**Figure 3**
*Number of publications per country*




We should note that Figures 2 and 3 represent author affiliations and not the context in which the research was done, and so cannot be used to assume information of the operationalisation of LA in these contexts.

There are 172 papers connected to the Open University (UK), 89 papers to Athabasca (Canada), 31 papers linked to authors at Unisa (South Africa), three papers linked to authors at the Open University in Cyprus and the Indira Gandhi National Open University (India) respectively and one paper to an author at the Open

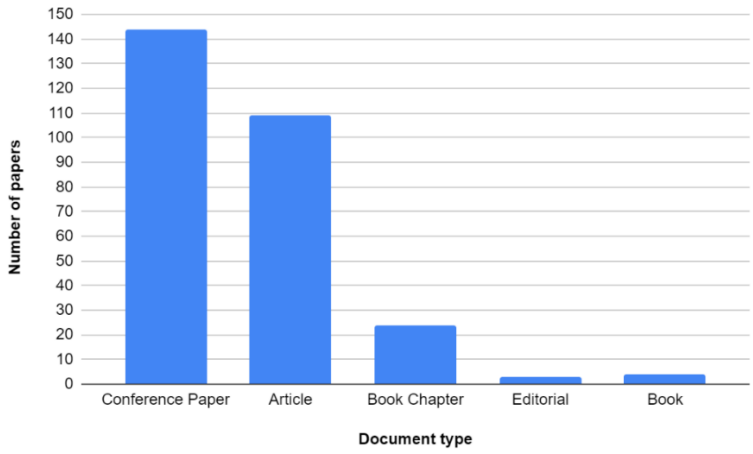
University of Tanzania. Collaborating authors outside of the 27 open universities are not listed. The table below presents the top 10 ranked authors and their affiliated country

**Table 1**
*Top 10 ranked authors and their country of representation*

| Rank | Author | Country | Identified paper count |
|---|---|---|---|
| 1 | Bart Rienties | United Kingdom | 62 |
| 2 | Kinshuk | Canada | 44 |
| 3 | Vivekanandan Kumar | Canada | 38 |
| 4 | Rebecca Ferguson | United Kingdom | 30 |
| 5 | Quan Nguyen | United Kingdom | 26 |
| 6 | David Boulanger | Canada | 25 |
| 7 | Paul Prinsloo | South Africa | 23 |
| 8 | Dirk Tempelaar<br>Jeremie Seanosky | United Kingdom<br>Canada | 20 |
| 9 | Sharon Slade<br>Christothea Herodotou | United Kingdom<br>United Kingdom | 16 |
| 10 | Martin Hlosta | United Kingdom | 15 |

Whilst journal publications are the gold standard, Figure 4 shows that the most popular route to publication was via conferences. It is unclear whether this reflects the emerging status of LA within open universities - further work would be needed to see whether this picture is reflected within higher education as a whole.

**Figure 4**
*Breakdown of papers by publication route*




As might be expected, most conference papers are linked to the annual Learning Analytics and Knowledge conference (see Table 2 below), but it is encouraging that other conferences are also recognising the value of LA research.

**Table 2**
*Top 5 ranked conferences*

| Rank | Conference | Publications count |
|---|---|---|
| 1 | Learning Analytics & Knowledge Conference | 62 |
| 2 | International Conference on Advanced Learning Technologies | 9 |
| 3 | European Conference on Technology Enhanced Learning | 6 |
| 4 | Annual ACM Conference on Learning at Scale | 5 |
| 5 | International Conference on Technology for Education<br>International Conference on Artificial Intelligence in Education<br>International Conference on Computer Supported Education | 4 |

Similarly, in the context of this study, most articles were published in the Journal of Learning Analytics, the official journal of the Society of Learning Analytics Research (SOLaR), see Table 3.

**Table 3**
*Top 5 journal venues*

| Rank | Journal | Publications count |
|---|---|---|
| 1 | Journal of Learning Analytics | 10 |
| 2 | Computers in Human Behavior<br>Open Learning | 7 |
| 3 | British Journal of Educational Technology<br>International Review of Research in Open and Distance Learning | 6 |
| 4 | Computers & Education<br>Frontiers in Education | 4 |
| 5 | International Journal of Artificial Intelligence in Education<br>Interactive Learning Environments<br>American Behavioral Scientist<br>Assessment and Evaluation in Higher Education | 3 |

Although other research (Prinsloo and Kaliisa, 2022) suggests that the paucity of LA research in the Global South may relate to a lack of distinction between LA and EDM, Figure 5 seems to suggest that this may not be the case since EDM research is also not well represented. Of the 190 papers referring to LA, 12 also refer to EDM. Only 6 publications focus only on EDM. Of these 5 are linked to Athabasca University and one to the Indira Gandhi National Open University in India.

'Undefined' refers to the absence of available abstracts, and/or the absence of any mention of LA or EDM in the abstract.

**Figure 5**
*Covered topics of Learning Analytics and Educational Data Mining in publications*

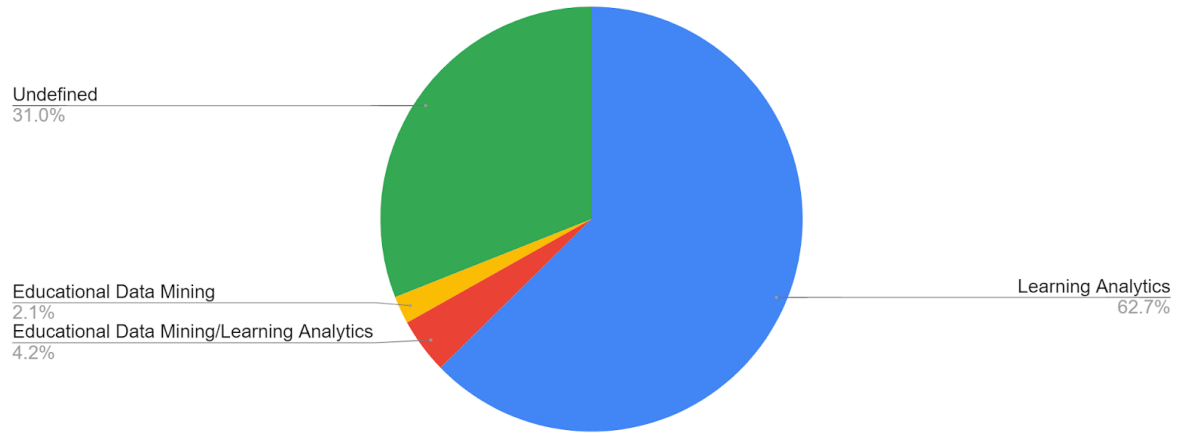
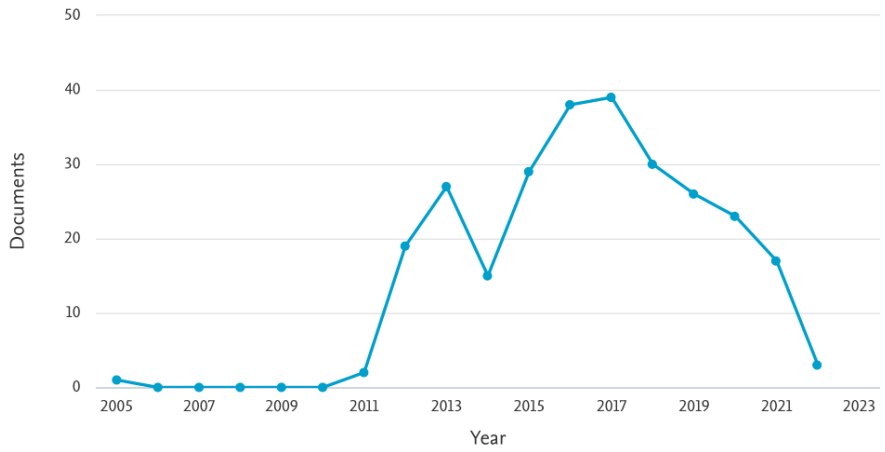



Figure 6 represents an overview of the number of documents on Scopus published since 2005 for both LA and EDM. Given the official launch of LA in 2011, it is no surprise that there is a spike from 2011. [In the light of word limitations, we used Scopus for the publication analysis as presented here, and Web of Science for Table 4 below].

**Figure 6**
*Publications over time in Scopus (n=269 documents)*




Compiled from the WoS database, the following 5 articles are the most cited:

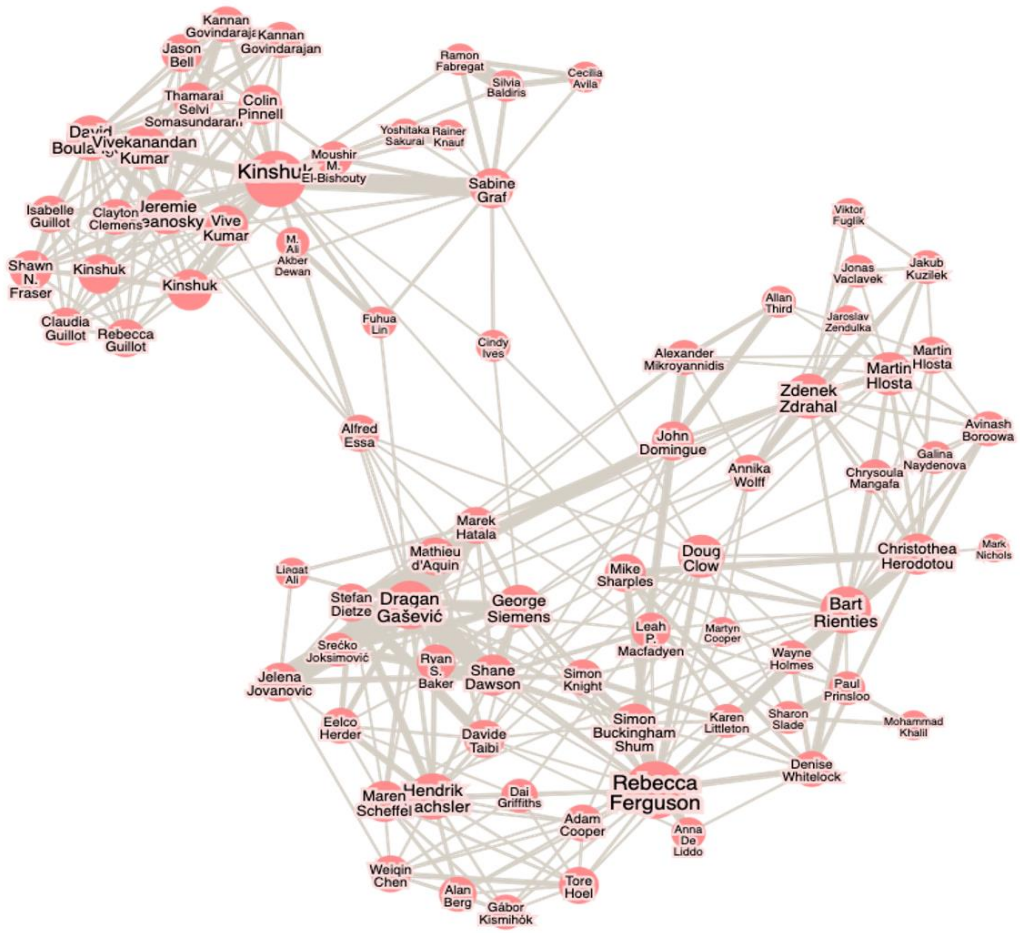
**Table 4**
*Most cited publications as of April 13, 2022*

| Reference | GoogleScholar Citations |
|---|---|
| Ferguson, R. (2012). Learning analytics: drivers, developments and challenges. International Journal of Technology Enhanced Learning, 4(5-6), 304-317. | 1406 |
| Siemens, G., & Baker, R. S. D. (2012). Learning analytics and educational data mining: towards communication and collaboration. In Proceedings of the 2nd international conference on learning analytics and knowledge (pp. 252-254). | 1169 |

| | |
|---|---|
| Baker, R. S., & Inventado, P. S. (2014). Educational data mining and learning analytics. In Learning analytics (pp. 61-75). Springer, New York, NY. | 1024 |
| Siemens, G. (2013). Learning analytics: The emergence of a discipline. American Behavioral Scientist, 57(10), 1380-1400. | 933 |
| Clow, D. (2013, April). MOOCs and the funnel of participation. In Proceedings of the third international conference on learning analytics and knowledge (pp. 185-189). | 819 |

Finally, the consolidated corpus of both Scopus and WoS were exported into ResearchRabbitApp (https://researchrabbitapp.com/). The resulting author network provides an overview of the linkages between different authors (Figure 7).

**Figure 7**
*Collaborating author networks*




The thicker the connecting lines and the bigger the author circles, the more productive the collaboration is and the more connections the author has. Figure 7 shows that Rebecca Ferguson, Doug Clow, Christothea Herodotou and Bart Rienties, all from the OUUK, and George Siemens and Vivekanandan Kumar from Athabasca University, Canada are important nodes in these collaborating author networks although an initial

examination suggests limited collaboration between the Global North and the Global South. One exception to this is the long standing collaborative relationship between the OUUK and Unisa (South Africa).

**Implications and pointers for future research**

This study has highlighted the paucity of LA research in the context of open, distance education, and particularly from open distance education institutions from the Global South. Further exploration on, for example, levels of digitisation and datafication among open, distance education institutions, and the use of institutional and learning/student data to provide student support and address concerns regarding high levels of attrition would help to fill this gap. The evidence indicates high levels of LA research in at least two open, distance education institutions; the Open University (UK) and Athabasca University (Canada). This suggests that there is significant scope for research collaboration and exchange of knowledge and expertise between open, distance education institutions in the Global North with those in the Global South. Those few pockets of LA research in open, distance education institutions in the Global South should be strengthened. The implementation of LA requires both high levels of maturity in ICT infrastructure, and at least some digitised and datafied teaching, learning and administrative systems and processes. Open, distance education institutions in the Global South might consider taking an opportunity to think critically about the scope and form of LA in (digital) data-poor environments.

**Limitations**

The limitations inherent in bibliometric research are well-documented, ranging from the scope of the databases themselves (Scopus and Web of Science), disciplinary differences, and the inherent limitations of the metrics. This study is no exception.

The findings reported here relate specifically to the 27 institutions listed in Mishra (2017).

**Conclusions**

Concerns about student attrition in higher education and specifically in open, distance education are well-documented. The increased digitisation and datafication of open, distance education institutions in turn provide opportunities for data-led and data-informed approaches for more effective, appropriate and ethical student support. Though learning analytics is no panacea for addressing the complexities of successful student learning, evidence suggests that its deployment can lead to more effective pedagogical designs and approaches, and impacts positively on students' learning.

This bibliometric analysis confirms that, outside of two open distance institutions from the Global North (OUUK and Athabasca), there is very little evidence of LA research at other open distance education institutions, most of which are situated in the Global South. This could perhaps be strengthened by creating collaborative relationships between researchers at open universities in the Global South with other established institutions.

While it falls outside of the scope of this paper to consider the reasons for the paucity of research on LA from the Global South, these may include lower levels of digitisation and datafication in the Global South, asymmetries in scholarly publication between the Global North and the Global South, and the languages in which research is published (Prinsloo & Kaliisa, 2022). More importantly, low levels of evidence of LA research from open universities in LA research might be considered a proxy for low levels of *adoption* of LA. Given the value of learning analytics in contributing to improved student support and success, particularly in an open and distributed learning context, this is regrettable.

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Appendix A  The 27 Open Universities in the Commonwealth

| | | |
|---|---|---|
| 1 | AIOU | Allama Iqbal Open University |
| 2 | AU | Athabasca University |
| 3 | BAOU | Dr. Babasaheb Ambedkar Open University |
| 4 | BOU | Bangladesh Open University |
| 5 | BRAOU | Dr. B. R. Ambedkar Open University |
| 6 | IGNOU | Indira Gandhi National Open University |
| 7 | KKSHOU | Krishna Kanta Handiqui State Open University |
| 8 | KSOU | Karnataka State Open University |
| 9 | MPBOU | Madhya Pradesh Bhoj (Open) University |
| 10 | NOU | Nalanda Open University |
| 11 | NOUN | National Open University of Nigeria |
| 12 | NSOU | Netaji Subhas Open University |
| 13 | OSOU | Odisha State Open University |
| 14 | OUC | Open University of Cyprus |
| 15 | OUM | Open University Malaysia |
| 16 | OUMa | Open University of Mauritius |
| 17 | OUSL | Open University of Sri Lanka |
| 18 | OUT | Open University of Tanzania |
| 19 | PSSOU | Pandit Sundarlal Sharma (Open) University |
| 20 | TNOU | Tamil Nadu Open University |
| 21 | UKOU | The Open University |
| 22 | UNISA | University of South Africa |
| 23 | UOU | Uttarakhand Open University |
| 24 | UPRTOU | Uttar Pradesh Rajarshi Tandon Open University |
| 25 | VMOU | Vardhaman Mahaveer Open University |
| 26 | WOU | Wawasan Open University |
| 27 | YCMOU | Yashwantrao Chavan Maharashtra Open University |