Do Learning Management Systems Live Up to Their Potential in Times of Crisis?

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Abstract

Contact institutions in South Africa have had to move teaching and learning into online spaces in response to the COVID-19 pandemic. While many, if not all, South African universities have some form of learning management system in use, the dependency on such systems increases significantly when that system becomes the lifeline between students and their institutions. Not much research has focused on the potential of learning management system data to inform institutional decision- making. This paper looks into how the Blackboard learning management system at the University of the Free State helped to understand lecturer and students' engagement - or disengagement - with their academic work during COVID-19, and more importantly, how it shaped responses through guiding institutional decision- making. Through this

DOI: https://doi.org/10.29086/978-0-9869936-6-4/2021/AASBS08
Chapter URL pp 194 – 217: http://alternation.ukzn.ac.za/Files/books/series/08/10-loots.pdf

reflection, we argue for the need to promote Academic Analytic practices in which learning management systems data could play a central role beyond COVID-19. For this to happen, however, there needs to be some effort put in place to promote the uptake and range of use of learning management systems.

Keywords: Learning management systems; blackboard; academic analytics; institutional research; decision-making

1 Introduction

The COVID-19 response is not the first involuntary move to online spaces for universities, and it certainly will not be the last. In the wake of the #FeesMustFall protests in 2016, where many institutions had to resort to online channels to complete the academic year, the sector seems to have been caught off-guard again four years later. As part of the COVID-19 response, the University of the Free State (UFS) and other institutions have been stepping up training and support to help staff and students make optimal use of digital platforms to enable learning and teaching. In addition, research and data analytic efforts to assess the extent of students' access to networks, the internet, devices, and the use of different data sources to inform institutional decisions, have also increased significantly in a very short time. In a country with a prominent digital divide under 'normal' circumstances, embedding technology in educational practices has been struggling to take off for a variety of reasons, and therefore this almost absolute reliance on technology has no doubt been a shock to the system.

In this chapter, we reflect on the role the Blackboard Learning Management System (LMS) at the UFS has played as the primary link between students, their lecturers, classmates, learning content, and the institution during the COVID-19 pandemic. LMS systems have been adopted by the majority of higher education institutions internationally and take on a variety of forms. In essence, an LMS aims to facilitate e-learning, to provide a platform for administrative tasks and to facilitate communication between lecturers, the institution, and students (Klobas & McGill 2010). Research on LMS systems has been dominated by a focus on its adoption by different role-players, with limited recognition of the potential these databases hold to inform institutional decision-making processes. Using a five-stage model of Academic Analytics

developed to guide institutional decision-making, we reflect on our experience with the UFS LMS during the pandemic and argue for the potential of these databases to play a central role in advancing Academic Analytics to guide student success efforts in the South African context.

1.1 Learning Management Systems

In the United States, EDUCAUSE (2018) reports that almost all higher education institutions make use of LMS systems to guide learning. A range of LMS platforms are also used by South African higher education institutions, including Blackboard, Moodle, SharePoint, Sakai, Vula, WebCT, and other self-developed systems (Bagarukayo & Kalema 2015). The attractiveness of an LMS is its ability to integrate a wide range of pedagogical and course administration tools (Croitoru & Dinu 2016). LMS platforms have also evolved to incorporate a range of interactive tools such as blogs, wikis, chat rooms and discussion tools. The main purpose of an LMS is to provide alternative avenues to facilitate learning, hence measuring its effectiveness depends on a variety of influencing factors ranging from institutional support to infrastructure and skills, and ultimately, lecturer and student use.

In assessing staff and student perceptions of the effectiveness of different LMS functions, Holmes & Prieto-Rodriquez (2018) found that the most commonly used functions for both groups were making documents available on the LMS, utilising discussion boards, and uploading recordings of face-to-face lectures. Students also noted documents and recordings of lectures as being the most effective functions of the LMS, while lecturers felt that document sharing and synchronous discussion sessions were the most effective, although less than a quarter of staff had engaged in synchronous discussion sessions. In China, Li, Su & Hu (2019) also found the most used functions (44%) of an LMS for lecturers were creating and distributing course content (including announcements and videos), followed by assessment (22%), and administration (14%), which includes teaching calendars, course reports, etc. The least used functions for the LMS were communication and collaboration (11%) and assignments (8%), which include quizzes, surveys, and homework tasks. Findings in the US point to a stronger focus on content, announcements and assessments, with fewer courses engaging with blogs, wikis, and journals (Machajewski, Steffen, Fuerte & Rivera 2019).

Beyond the use of certain LMS functions, studies have also looked into

the usefulness of LMS platforms. For example, introducing a more blended approach to medical education in a Saudi Arabia case led to students appreciating the formative assessments on the LMS platform to prepare them for larger exams (Baig, Gazzaz & Farouq 2020). In an earlier review of literature on the effectiveness of LMS, Zanjani, Nykvist & Shlomo (2013) list five factors critical for optimal and successful engagement with LMS. These include teacher attitude and skills, student attitude and skills, LMS design, learning materials characteristics and the availability and quality of external support.

LMS engagement has been criticised for being too time consuming (Jurado 2012), and too instructor-centric, as it is often seen as a source of one-way communication or distribution of resources (Cochrane & Narayan 2017; Mott & Wiley 2009). Challenges with internet connections, such as slow uploading/downloading or fractured connections, as well as technical issues related to accessing the LMS have also been found to influence students' perceived usefulness of such systems (Juhary 2014). Similar frustrations as well as the challenges associated with general technology adoption in South African higher education, and studies on LMS use in the sector, also highlight some key problems. Sackstein, Coleman and Ndobe (2019) argue that LMSs are not necessarily adapted to developing contexts where challenges such as low technical literacy, multilingualism, and resource deficiencies are commonplace. Therefore, inclusive education in these contexts needs to consider contextual issues in order to take part in the intended benefits of these systems. Other studies highlight a lack of digital competence and comfort among staff, and a rigidity in teaching and learning practices that do not make way for newer, innovative ways of incorporating LMSs into learning (Govender & Govender 2014; Webbstock & Fisher 2016). Further, confirming these findings from a different perspective, Coleman and Mtshazi (2017) found that lecturers' motivations to use LMSs depend on familiarity with the platform, computer self-efficacy, appropriate training to use the LMS, availability of technical support, an interest in learning about the platform, and a general sense of the usefulness and quality of the LMS, all contributed to their engagement with the platform.

Arguably, the greatest concern featuring in LMS research is getting people to adopt technology. Twenty years ago, Eugene & Robert (2000) noted a consistent pattern regarding the acceptance and use of new educational technologies is that almost half of new information systems projects fail on an

annual basis. This trend has continued to inform a body of literature on the motivations underlying technology adoption, and continuation of use (Zanjani, Nykvist & Shlomo 2013). Consequently, a range of theoretical approaches has evolved to explore technology adoption. Two of the most commonly used include the Technology Acceptance Model (TAM) (Davis 1989) and the Unified Theory of Acceptance and use of Technology (UTAUT) (Venkatesh, Morris, Davis & Davis 2003). The TAM highlights the interplay between four constructs determining technology acceptance: the perceived usefulness and perceived ease of use of technology, attitudes toward using technology, and behavioural intention to use technology. The TAM proposes that if a person finds technology easy to use and sees the usefulness of it, then it would change their attitude towards the technology and result in more use. This seemingly logically deduced model has been used widely in research on LMS adoption (e.g. Alharbi & Drew 2014; Bove & Conklin 2019; Juhary 2014; Li 2011). Similarly, the UTAUT states that four constructs play a significant role in user acceptance and behaviour, including the degree to which an individual believes that using the system will enable job performance, the ease with which a system is used, an individual's perception of the importance of use other important people might have, and the extent to which conditions enable engagement with technology (Coleman & Mtshazi 2017). Beyond technology adoption, a variety of other theories have been used to explore the interactions between users and LMS. Hillmer (2009) helpfully groups these theories by purpose, for example, a set of theories focusing on technology, the environment and the organisation as user; employee interest; organisational or management interest; individual cognitive interest; or strategic organisational interest.

The predominant focus on user experiences and uptake has left some gaps in research on LMSs. Most relevant to the current discussion is the use of LMS data to advance data analytics and support institutional decision-making. The development of data analytics in the field of higher education is opening up avenues for implementing related methodologies, such as data mining. For example, Cerezo, Sanchez-Santillan, Paule-Ruiz & Nunez (2016) used Moodle logs to cluster students' behaviour patterns and correlate with academic achievement. Their method allowed a much more in-depth analysis of students' interactions with the LMS and their academic achievement. The time groups spent on different activities allowed assumptions to be made about the depth of their engagement with tasks, as well as their procrastinating beha-

viours. The importance of peer learning also manifested through forums and other social tasks, contributing to the efficiency of groups' academic performance. However, studies like these are scarce, mainly because the vast amounts of data generated by the LMS are difficult to extract and analyse, and often require specialised data analytic skills for both data extraction, analyses, and interpretation (Machajewski, Steffen, Fuerte & Rivera 2019).

1.2 Academic Analytics and Institutional Research

Data analytics is an overarching term referring to the process of turning raw data into absorbable information. In higher education, two forms of data analytics stand out: Learning Analytics, and Academic Analytics. Long & Siemens (2011) differentiate between the concepts by ascribing Learning Analytics to information that helps institutions understand the learning process, while Academic Analytics is a broader conceptualisation of how institutions use data and information to guide decision-making at different levels and across institutional functions. Both, however, have a strong focus on implementing statistical and predictive methods and technologies to advance student success.

In South Africa, while both of these concepts (Learning Analytics and Academic Analytics) are still in development, contextual priorities such as focusing on students' access and success, have led to a stronger focus on Learning Analytics (e.g., Lemmens & Henn 2016). Of the sparse literature on Learning and Academic Analytics in South Africa, the majority stems from the University of South Africa (UNISA), which, because of its size and distance education orientation, has had to find ways of managing Big Data (Fynn & Adamiak 2018; Prinsloo, Archer, Barnes, Chetty & van Zyl 2015), as well as considering the ethical implications of data analytics at such scale (Fynn 2016; Willis, Slade & Prinsloo 2016). Beyond UNISA, other recent publications on Learning or Academic Analytics focus on developing models for predicting students' academic performance or to guide enrolment planning (Bleazard & Lourens 2015; van der Merwe, Kruger & du Toit 2018), and developing models or frameworks to guide university teachers to support student success (Janse van Vuuren 2020; Leppan, van Niekerk & Botha 2018). In contrast, Ngqulu (2018) reflects on the importance of adopting Learning Analytics in higher education, but also provides some challenges, such as a lack of capacity, infrastructure, monitoring and ethical considerations that hinder its progress-

sion. No literature could be found in the South African context linking LMS and data analytics.

The value of Academic Analytics in particular is reflected in its contribution to institutional decision-making. In South Africa, the disciplinary field of Institutional Research (IR) has only recently been awarded appropriate academic exploration through an edited book, *Institutional Research in South African Higher Education* (Botha & Muller 2016), which provides conceptual links to practices often evolving as the need arises. Such conceptual links are necessary for institutional researchers and data analysts to know why they do what they do. A long-standing foundational conceptualisation of the role of IR and institutional researchers is Patrick Terenzini's (1993) three-tier model of organizational intelligence. The first tier demands *technical or analytics intelligence*. IR needs to contribute to the institution's every-day operational knowledge; for example, how many students are enrolled in certain courses, etc. The second tier, *issues intelligence*, demands contributions to institutional level decisions, including resource allocation, facilities planning, programme and staff evaluations, and requires a deeper understanding of the political undercurrents that influence institutional decisions. Finally, the third tier, *contextual intelligence*, requires an understanding of the institution within the broader sector, and beyond. Thus, guiding institutional decisions with due consideration of the institution's history, mission and vision.

Informing institutional decisions in line with Terenzini's tiers requires more than mere reflection on data based on intuition, experience, or anecdote. It demands scrutiny of facts, implementing a range of statistical methods, and testing possible solutions to challenges faced by institutions. In this sense, Academic Analytics consists of different processes, including 'gathering and organising information' (often from different sources and in different forms), analysing and manipulating data, and using the results to answer questions such as 'why,' 'what can we do about it', or 'what happens if we do *x*' (Campbell & Oblinger 2007: 3). Through developing Academic Analytics, institutions make a conscious effort to implement an evidence-based approach to IR and ultimately inform institutional decisions to advance student success. Campbell & Oblinger (2007) provide a helpful, five-step framework to map Academic Analytics against: capture, report, predict, act, and refine. The first step, *capture*, refers to the process of obtaining data. This seemingly simple task depends on numerous pre-emptive actions pertaining to data governance, data management, data quality, and normalisation of data. During the second step,

report, staff make use of appropriate tools (programmes, software, etc.) and skills to identify patterns and analyses in order to compile reports, which might take form in traditional reporting (tables of data) or dashboards. The third step, *predict*, allows analysts to apply statistical models to the data to inform policy and practice. For example, predicting success rates from high school mathematics scores could influence admissions policy for degrees in natural and agricultural sciences. The fourth step, *act*, embodies the ultimate goal of Academic Analytics – to produce actionable information for the institution to use. The actions taken by the institution based on analytic information might range from making informed decisions to implementing reactive or proactive support structures. There is also a focus on measurement accompanying the action step – to build on the evidence-based institutional culture, to ensure accountability, and to inform the last step in the process. Finally, the last step, *refine*, provides space for reflecting on where processes and outcomes could be enhanced.

Using these steps as a guide, the following section describes how the UFS responded to the COVID-19 pandemic by relying heavily on Blackboard LMS data to guide institutional decision- making. In the last step, we reflect on how these practices could be continued and enhanced under less pressured circumstances.

2 Applying the Five Stages of Academic Analytics

As with other universities in South Africa, the UFS had to move all institutional functions to online spaces in response to the COVID-19 pandemic. Two key support structures were put in place for staff and students. For staff, the *#UFSTeachOn* platform focused on providing training and support for lecturers to extract core module outcomes, align teaching and assessment with these outcomes in remote learning formats, and dealing with the realities of students' challenges to engage with their studies during this time. The key lessons learned from a Carnegie-funded evaluative study of the #FeesMustFall experiences provided the foundation for the development of the resources and training material as part of the *#UFSTeachOn* campaign. These lessons include the importance of knowledge of sound pedagogy of online teaching, which formed part of the resources, as well as the importance of training in online assessment design and development, which formed part of the training. As part of the *#UFSTeachOn* campaign the Blackboard *#UFSTeachOn* portal was

launched and supported by webinars. A total of 1409 academics participated in webinars focused on creating learning environments that are student-centred, and delivering learning and teaching for low-tech, remote scenarios. Importantly, this approach took account of the fact that students have limited access to data, networks, and in some cases, devices.

For students, the *#UFSLearnOn* campaign consisted of a series of low-tech, downloadable publications that served to provide information on support structures, contact information for various academic or non-academic services, and strategies to cope with, and effectively engage with the new realities of remote learning. Traditional student support structures, including the Academic Student Tutorial Excellence Programme (A_STEP), Academic Advising, the first-year skills module, student counselling and the careers office all moved their services to Blackboard and other platforms. Parallel to the main support structures, a task team was set up to make sure that no students are left behind.

This extensive and multi-pronged approach has a strong evidence-base. For the majority of these interventions, Blackboard data played a key role to track progress of the *#UFSTeachOn* and *#UFSLearnOn* campaigns to point out blind spots in participation, to inform further investigation, and to guide decisions to initiate interventions where needed most.

2.1 Capture

A strong data-driven approach was implemented to support staff and students. Data sources during COVID-19 included survey data, Blackboard data, PeopleSoft Gradebook data, and institutional demographic data. At the end of March 2020, the Centre for Teaching and Learning (CTL) sent out a survey to students to assess whether they had access to reliable network, internet, and devices from which they could study. Previous work on this, such as the biannual Digital Identity survey, could not provide much information since students were not only off-campus during the lockdown, but spread out across the country, many of them confined to deep rural areas. The Student Access to Devices and Data survey was completed by 13,505 students and revealed that, while 92% of students had access to at least one internet-capable device, the majority of these devices were cell phones, with less than 60% of students owning laptops (CTL 2020).

As with many other institutions, prior to COVID-19 the UFS had not

optimally made use of Blackboard data as a primary source of data analytics – partly because of the capacitation reasons listed earlier by Machajewski *et al.* (2019). In addition, and also as many other institutions, the lack of uptake and use of the full range of tools of the LMS prior to COVID-19 made it a less reliable source of information when compared to other institutional data sources. Thus, with Blackboard's sudden thrust into the role as the primary means of teaching and learning, data analysts had a rich dataset to work from. Data were extracted from the Blackboard server and linked to relevant institutional data to provide deeper insight.

2.2 Report

Moving all face-to-face teaching and learning activities online in a matter of weeks was a daunting task for lecturers and support staff alike. Moreover, the knowledge that many students are not equipped with optimal devices, or do not have adequate access to data, internet or a stable network, necessitated thinking beyond merely doing online lectures or uploading recordings. Weekly reporting on the Blackboard activity of students and staff allowed the CTL, the faculty Teaching and Learning Managers (TLMs), and lecturers to track participation on an individual level. With over 5000 modules on Blackboard, over 2,000 lecturers, and over 40 000 students, making sure that everyone was participating initially seemed like an overwhelming task.

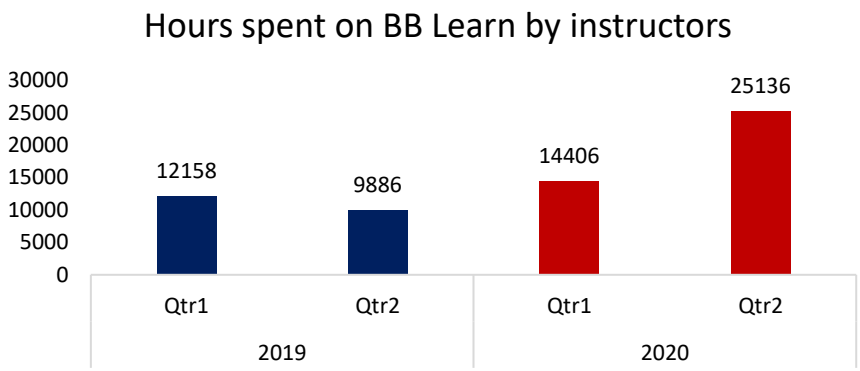

Figure 1: Number of hours spent on Blackboard by lecturers during the first semester in 2019 compared to 2020

The number of modules using Blackboard increased by 15% between 2019 and 2020. In addition, Figure 1 shows a significant increase in the hours lecturers spent on Blackboard during the first semester of 2019 compared to 2020. The number of hours further almost doubles between the first and second quarter of 2020, with lecturers spending over 25 000 hours on the LMS. These hours exclude the time spent on Blackboard Collaborate, which is the main platform for live communication, thereby testifying to the significant effort lecturers put in to get acquainted with the LMS to move all learning online.

Keeping the digital divide in mind from the onset of remote learning preparations, lecturers were guided to develop low-tech approaches to learning and teaching. This included, for example, smaller documentation to download or access, keeping communications regular and clear, but limited to once a week, and implementing more formative-type assessments to gauge students' understanding of the work. Figure 2 shows the number of hours students spent on Blackboard during the first semester of 2019, compared to the same timeframe in 2020.

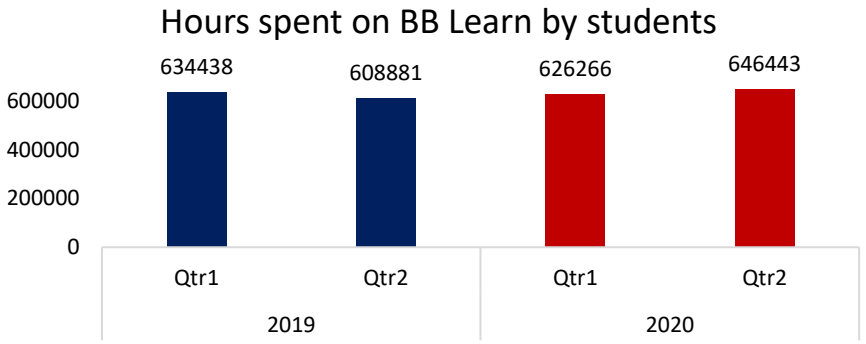

Figure 2: Hours spent on Blackboard by students in the first semesters of 2019 and 2020

While there is a slight increase, of 6% between 2020 and 2019, the objective of keeping interactions with the LMS low-tech to avoid students having to spend a lot of time on the LMS or frequently access it, was reached.

Aligned with literature from national and international studies shared earlier, the most frequently used functions on the LMS relate to a one-way sharing of documentation (Figure 3). However, while this was done

purposefully during 2020 in order to support a low-tech approach to learning, it does not explain the similar trend in 2019.

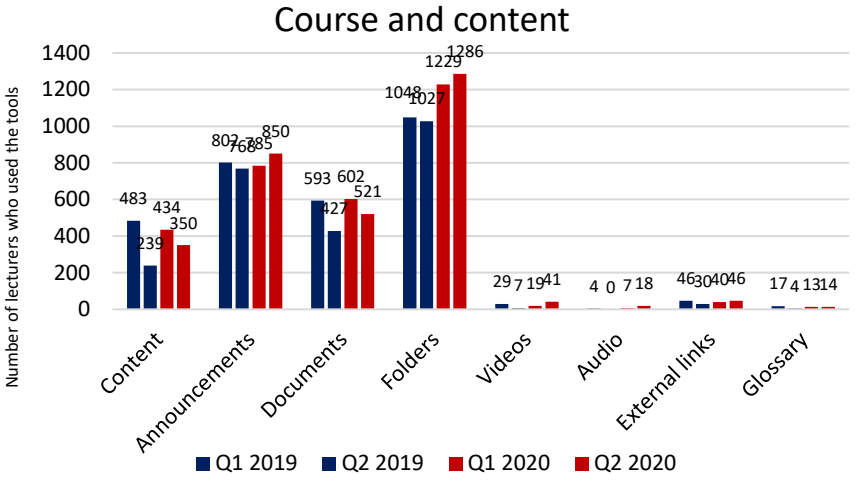

Figure 3: Most and least used functions of the LMS

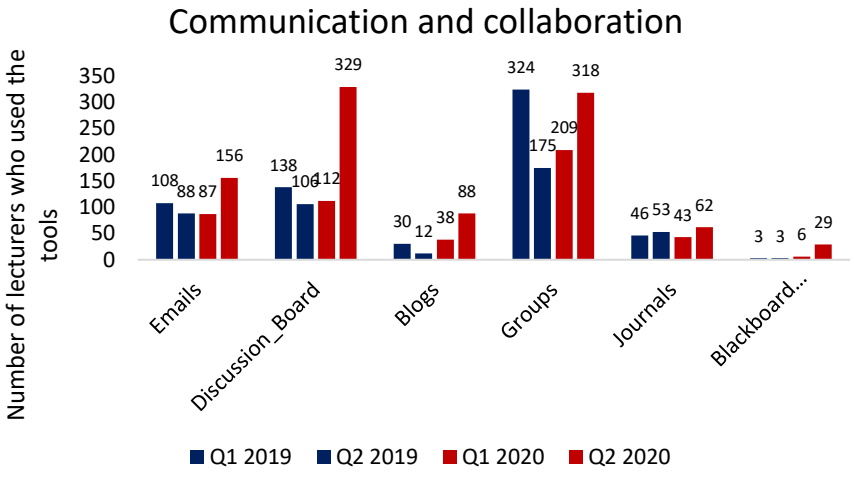

Figure 4: Using the LMS for communication and collaboration

A survey sent out to guide the *#UFSLearnOn* content showed that 96% of students are in contact with their peers via WhatsApp, while around 70% are also using WhatsApp to engage with their lecturers. While there is a significant increase in the use of discussion boards as a communication platform between 2019 and 2020, there are just over 300 lecturers making use of this function. The most used LMS communication platform is forming groups for collaborative learning (Figure 4).

Arguably, the biggest concern of the broader sector during the COVID-19 response is to leave no student behind. Blackboard data allowed the CTL to keep track of students' participation through different means, such as identifying students who had not accessed the LMS, looking into vulnerable students' participation, and identifying students who had not engaged with assessment tasks. As Figures 5 and 6 show, the number of students who did not log on to Blackboard during the transition to remote learning between 20 April and 12 May 2020 were identified and shown here per faculty. In general, the 506 and 331 students from the Bloemfontein and QwaQwa campuses make up 2.5% of the undergraduate student population.

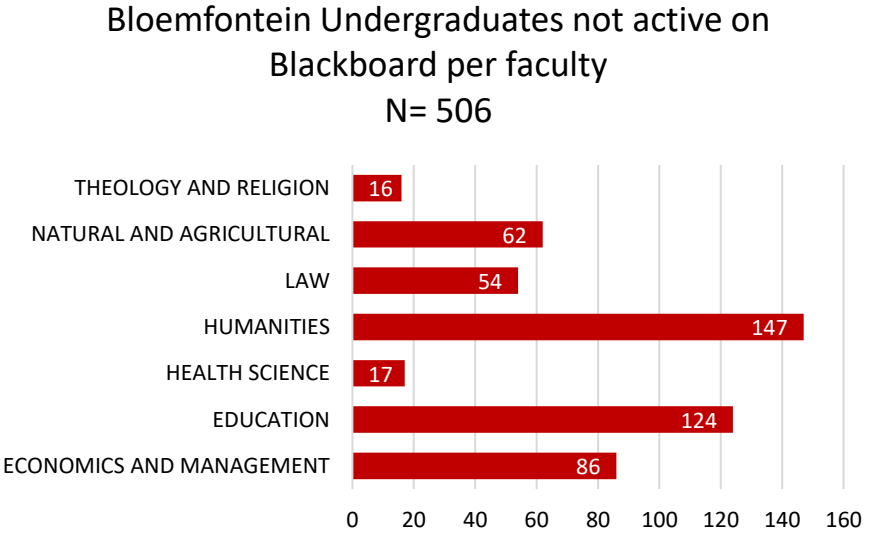

Figure 5: Number of undergraduate students on the Bloemfontein campus who did not log on to Blackboard between 20 April and 12 May 2020 per faculty

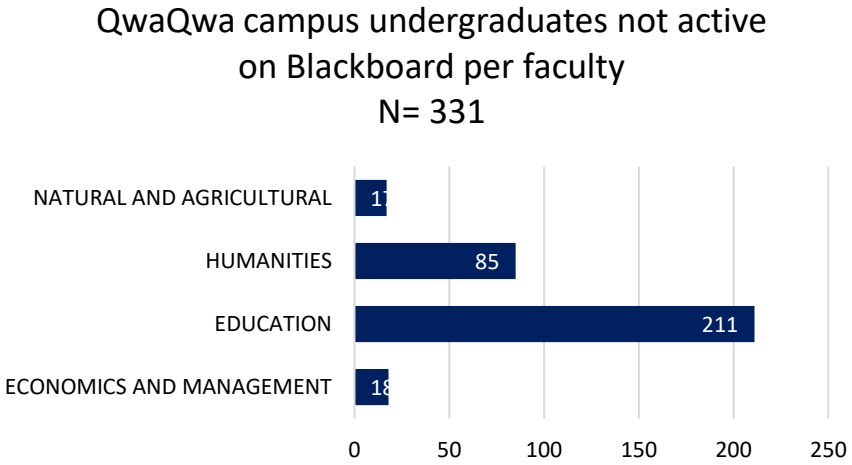

Figure 6: Number of undergraduate students from the QwaQwa campus who had not logged on to Blackboard between 20 April and 12 May 2020 per faculty

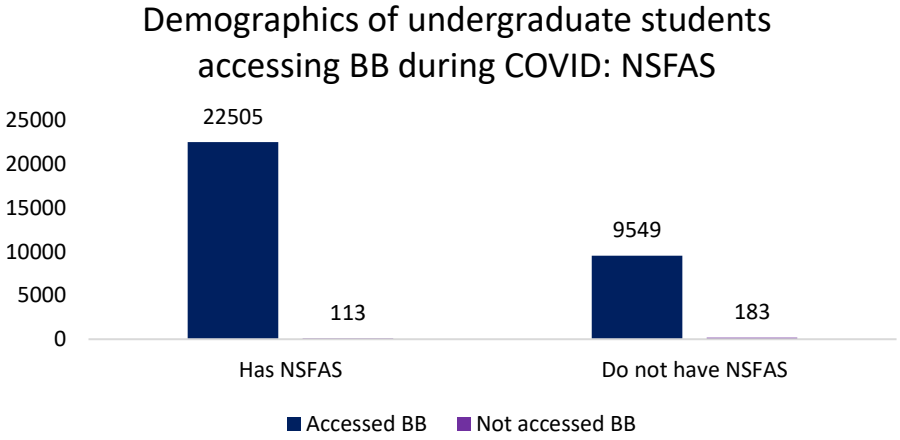

Figure 7: NSFAS students accessing Blackboard

Merging Blackboard data with institutional data also allows an exploration of how vulnerable students are faring. For example, Figures 7 and

8 show that 113 students who receive NSFAS were among the group of students who did not access Blackboard during the transition time. Further, about 1% of students from each quintile school have not accessed Blackboard, with the largest portion being from quintile 3 schools (73 students or 1.23% of students from quintile 3 schools).

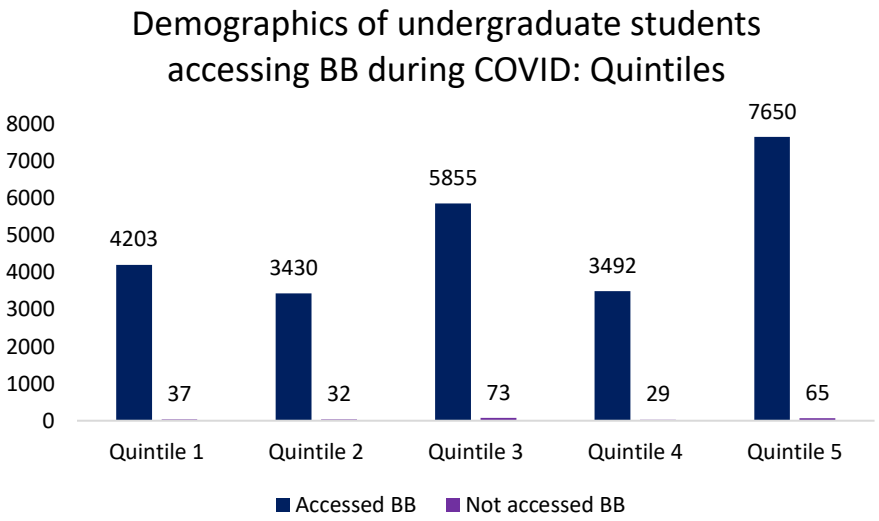

Figure 8: Undergraduate students accessing Blackboard by school quintile

Blackboard data also allows the tracking of assessments. By combining Blackboard assessment data with institutional data, we could distinguish between students who had not made use of relevant Blackboard functions, but had marks allocated to them, as well as students who neither had Blackboard function data, nor marks. Figure 9 shows that during two months of remote learning, 1691 students received marks for assessments they did not access via the LMS. Further investigation showed that lecturers are making other plans to allow students to submit tasks or assignments via email or other platforms, such as WhatsApp.

Merging Blackboard data with institutional assessment data further enabled faculties and TLMs to identify which modules had not recorded any

assessments, as well as allowing the CTL to identify students who had not engaged in any form of assessment during remote learning.

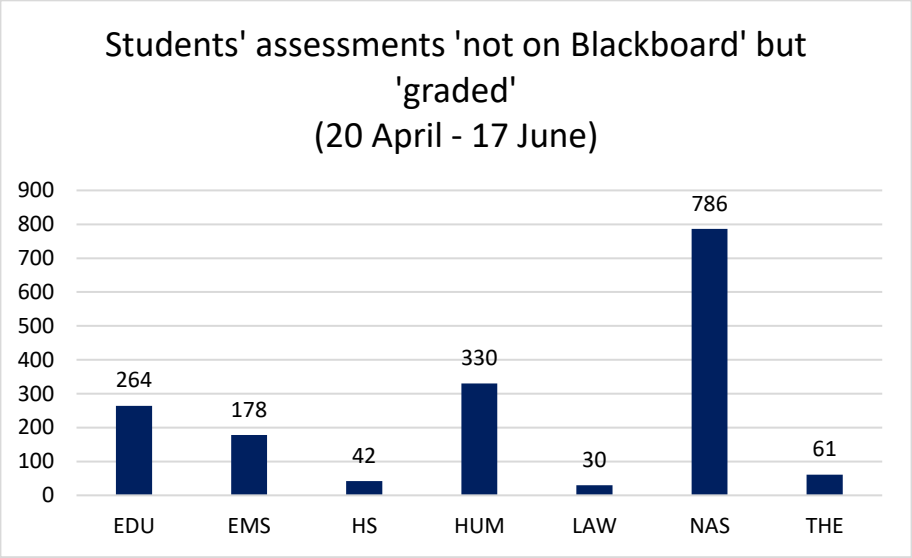

Figure 9: Number of students who did not engage with assessments on the LMS but received marks

2.3 Predict

The work the UFS has done in predictive analytics did not quite prepare the institution for COVID-19. However, conceptual work done during COVID-19, such as the development of the Vulnerability Student Index (VSI), will play an important role in future predictive analytic work. The VSI is based on six criteria ranging from students' school quintile, whether they are recipients of bursaries from the National Student Financial Aid Scheme (NSFAS) or receiving Funza Lushaka bursaries, to the status of their undergraduate degree completion. Through this analysis, over 3 000 students that needed help with appropriate devices for learning were identified.

2.4 Act

Identifying students who are not participating in teaching and learning activities was only the first step. An example of one of the interventions that flowed from engagement with Blackboard data is the *No Student Left Behind* initiative, which was developed to engage with the 989 students across three campuses that had been inactive on Blackboard during the transition period 20 April and 12 May 2020. This initiative, coordinated by the Central Academic Advising Office in CTL, entailed mobilising faculty advisors, TLMs, and other trained support staff to contact each student on the list to find out what their challenges were and how the institution could assist. At the time of writing, around a third of students had been reached, 70% of whom had since been able to access Blackboard at least once after the call. Some faculties had also taken their own initiative to identify and contact students who were not active on Blackboard – as tracked through data available to course organisers. As suspected, the majority of students' challenges related to access to devices, difficulties using the application that allows free usage of educational websites, and unstable network or internet connections.

2.5 Refine

Some important lessons learnt during COVID-19 have direct implications for how the UFS, and other institutions, could advance Academic Analytics. First, developing capacity. An evidence-based institutional culture demands analysts who are able to provide information to decision makers that take all three tiers of Terenzini's (1993) IR framework into account. That implies that analysts need to have an in-depth understanding of the educational contexts they are working in and make judgements about what data to present. The capacity of data analysts also includes cross-sectional skill sets. For example, a range of data mining methods could be used to analyse and predict behaviours, including logistic regressions, decision trees, random forests, or neural networks. However, the increasingly complex higher education environments demand increasingly sophisticated methods to meet analytic expectations (Raju & Schumacker 2016).

One of the main reasons why LMS data is underused is a lack of capacity to extract and analyse data (Machajewski *et al.* 2019). This was also the case at the UFS during COVID-19, with analysts attending training in Blackboard analytics while having to report on institutional progress. As a

result, several data analysts occupying different positions in the institution have already signed up for the Blackboard courses.

The second lesson comprises the availability of appropriate tools and infrastructure. Higher education institutions have ever-growing databases that include student and staff demographics as well as student and institutional performance indicators. This also implies that different data systems need to be able to 'talk' to each other, mainly through establishing and implementing a data warehouse that extracts information from scattered information systems into a centralised storage unit, standardises the data, and makes it available for further analyses (Leo Willyanto Santoso 2017). While some South African institutions, as well as the Department of Higher Education and Training,[1] are moving towards data warehousing, these efforts are still in development. In addition, a range of analytic software and other tools to visualise data, track progress, automate processes, or conduct predictive analyses is available to support data analysts as well as to make data more accessible to users. Investing in such tools is vital to advancing an evidence-based culture.

The third and final lesson is that creating a culture of evidence is not an easy process. The intensified reliance on data to guide decisions during COVID-19 compelled all levels of staff to confront anecdotal beliefs and explore the value of data and how to use it. An initial sense of distrust in the data by some was soon replaced by acceptance and actively asking for additional data points.

3 Conclusion

The question posed in the title of this chapter is *Do learning management systems live up to their potential in times of crisis?* To answer this question, one must first recognise the potential of such systems. For the most part, up till now, at the UFS and many other institutions, the use of LMS has been limited to a select few functions, primarily related to sharing content and announcements. However, extracting server data during the pandemic has been an invaluable source of evidence for the UFS to guide decisions and actions, particularly to track progress, identify blind spots for faculties to follow up on, and to inform interventions. The LMS was also the only reliable way in which

[1] See website for the Higher Education and Training Management Information System https://webapps.dhet.gov.za/

to identify whether vulnerable students were able to transition to remote learning and to keep track of how and whether learning and teaching was taking place. The weekly Blackboard reports showed that the low-tech approach was working, with lecturers spending significantly more time on the platform to prepare and share content, while students' LMS interaction time stayed more or less the same as in 2019. The data also allowed vertical exploration of participation down to individual student level, as well as horizontally merging and cross-referencing data with complementary institutional data to track participation. Most importantly, the data guided action. Knowing who has trouble keeping up with the COVID-19 response has allowed support structures to pin-point their focus to help those in greatest need.

The question is, what happens when lecturers are no longer exclusively dependent on the LMS to facilitate teaching and learning post-COVID-19? While it seems unlikely that everything will merely return to the way it was before COVID-19, we have to consider means to keep lecturers and students engaging with the LMS. This would also imply diversifying its use, as the UFS data corresponds to national and international literature in that the range of functions the platform offers is underused. It might therefore be necessary to revisit technology adoption frameworks such as the TAM or UTAUT, as well as recommendations such as those of Zanjani *et al.* (2013), that focus on developing teacher attitudes and skills, student attitudes and skills, LMS design, learning materials characteristics and the availability and quality of external support to optimise engagement with LMS systems. Promoting the use of the LMS will directly impact the value of the data contribution to Academic and Learning Analytics.

Ultimately, Academic Analytics hold great promise for the higher education sector in South Africa. The development and use of systems that enable data integration, analyses and visualisation make data more accessible to decision makers, which, taken together, enable faster responsiveness and proactive responses to support students and staff.

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