Students' Digital Readiness for – and Satisfaction with – Online Learning: A Case Study of the University of KwaZulu-Natal, South Africa

Mogie Subban
https://orcid.org/0000-0003-4595-0504
University of KwaZulu-Natal, South Africa
subbanm@ukzn.ac.za

Sanjay Soni
https://orcid.org/0000-0002-1365-5175
University of KwaZulu-Natal, South Africa
sony@ukzn.ac.za

Indira Padayachee
https://orcid.org/0000-0002-6838-7622
University of KwaZulu-Natal, South Africa
padayacheei@ukzn.ac.za

Abstract

The Covid-19 (acronym for the coronavirus disease of 2019) pandemic has signalled significance for online teaching and learning in higher education institutions (HEIs) both locally and internationally. This article reports on an empirically approved study that aimed to assess students' digital readiness for online learning at the University of KwaZulu-Natal (UKZN), South Africa. The article presents the main areas examined to assess intrinsic and extrinsic factors influencing students' online readiness with respect to their technical requirements; engagement with learning tools and resources; digital readiness; and satisfaction with the Moodle (acronym for Modular Object-Oriented Dynamic Learning Environment) online learning tool. Understanding students' online learning readiness was deemed necessary for assisting UKZN in understanding such interventions and making improvements. The study drew on 400 students' responses to a descriptive research design questionnaire to collect data from convenience-based purposive sampling. The constructs under study were measured for reliability using Cronbach's alpha. The results indicated that most of the students used laptops to access learning resources, followed by smartphones. Technically, the students did not express difficulties with reliable electricity supply access and university data packages, but the noted deficiencies of network coverage, internet connectivity and provision of specialised software. While the students seemed ready to engage learning tools, nevertheless improvements could

be made in participating in discussion forums and working in groups. Moodle received strong support, particularly for its continuous availability and flexibility. Interestingly, the study showed that the students were digitally ready for online learning, barring some improvement areas for readiness, although wider perspectives in tracking online learning are envisaged.

Keywords: digital readiness for online learning; online learning; engaging with digital and technological learning tools; online learning tool characteristics

Introduction

Online learning has taken the world by "storm", and in higher education, it has fundamentally changed the teaching and learning space. These changes were precipitated by the Covid-19 (acronym for the coronavirus disease of 2019) pandemic. New modalities of teaching and engagement together with continuous advances in technology including learners' growing expectations have led to a renewed interest in the uptake of information and communication technologies (ICT) of higher education. Through online learning, learners are able to access their instructional content and learning activities in real time, at any time, without the inconvenience of having to physically present themselves in a classroom. Furthermore, they are able to benefit from a volume of diverse resources whilst engaging in online activities to enhance their knowledge, skills and practice with the learning materials. The advantage of being able to communicate with lecturers and their peers through remote learning makes it all the more convenient (Adanir et al. 2020, 149). It can be said that through online learning, relevance to instructional materials including the learners' attention helps to build their confidence relating to intrinsic and extrinsic factors.

To cope with the changes, the University of KwaZulu-Natal (UKZN), like many other residential higher education institutions (HEIs), adopted a blended approach to teaching and learning. This meant that the traditional method of face-to-face lectures conducted in lecture venues was informed and complemented by digital modes through the online learning tool known as Moodle (acronym for Modular Object-Oriented Dynamic Learning Environment). The immediate transition from a blended approach to an online remote teaching and learning approach at UKZN arose when Covid-19 hit the global arena. This shift to an exclusive online learning mode took place almost instantaneously when the pandemic arose in an attempt to operate via remote teaching and learning. UKZN adopted multiple online options to advance students' learning. However, the transition to a complete online learning solution posed challenges in respect of students' digital readiness for and satisfaction with online learning. Research in online learning shows that 25–60% of students display more material retention and 40–60% less time to complete assignments due to online learning being individually paced (Li and Lalani 2020 cited in Singh et al. 2022, 315). The notion of little attention being given to students' digital readiness for and satisfaction with online learning is supported by Rivers, Vallance and Nakamura (2021, 103) who state that research into online learning has traditionally taken second place with attention given to face-to-face learning situations. Given the Covid-19 pandemic

impacting on higher education, amongst others, in such drastic ways, this situation has recently placed a great demand for and a growing volume of literature towards online learning research. Students' familiarity with online learning prior to the Covid-19 pandemic could have made the online transition easier in, amongst others, gauging their readiness for and level of satisfaction with this mode of teaching and learning to achieve success.

Conceptualising Digital Learning in Higher Education

In conceptualising digital learning in higher education, it is to be appreciated that several arguments exist in favour of digitising learning in the educational sector. Students in the 21st century are often referred to as "digital-age learners", as they have access to the latest technological devices and a wide range of open educational resources, which has made them less dependent upon traditional HEIs for knowledge acquisition.

Accessibility, affordability, pedagogy, life-long learning and policy issues relating to online learning take a blended approach to a flipped classroom environment thereby increasing the students' learning potential. Online learning is thus seen as a panacea to higher education in the time of crisis (Dhawan 2020, 2).

Technology Requirements for Online and Hybrid Courses

Teacher and student access to technological resources in the form of appropriate hardware, software, infrastructure and technical support is a key requirement of digital readiness for online learning (Blundell, Lee and Nykvist 2016). Students with financial means have a variety of choices in terms of technological devices for online learning. With mobile computing, wireless devices – such as smartphones and tablets – are being used to access the internet and undertake applications such as word processing. Similarly, the decrease in the cost of internet access and wireless devices means there are unlimited opportunities for online learning (McGreal and Elliott 2008). In fact, according to a student readiness study undertaken in the Pacific, the use of mobile devices was considered by the majority of the students as a "good idea" (Reddy et al. 2016, 258).

Estira's (2020) study found that the more technological devices students owned, the greater their readiness for self-directed learning was. In addition, online learning readiness scores were higher for students who owned computers (Estira 2020). Similarly, Firat and Bozkurt (2020) found that there were positive correlations between online readiness and technological devices – such as smartphones, laptops and tablets – with students showing a greater preference for smartphones. In support of the importance of technological devices for online learning and readiness, Warden et al.'s (2020) study showed that students who had lower technology readiness exhibited lower self-efficacy.

One of the key issues for online learning is having access to the internet. In fact, in their study on variables affecting online readiness, Firat and Bozkurt (2020) found that those

students who spent more time on the internet per day (greater than three hours) obtained higher averages.

Due to the digital divide, which is particularly problematic in Africa and more particularly in South Africa (Mpungose 2020), online learning and readiness can be a challenge. In mitigating this challenge, HEIs have made computers/laptops available to particular students and provided access to Wi-Fi facilities on campuses and at residences (Mpungose 2020). However, problems with internet access is a frequently cited challenge (Matarirano, Yeboah and Gqokonqana 2021), especially for students in rural areas due to affordability problems (Dube 2020) and poor network speeds, which negatively impact online learning (Chang and Fang 2020), and consequently readiness.

Engagement with Online Learning Tools in Moodle

Moodle is an open-source course management system (CMS) that universities, other HEIs as well as individual instructors use to harness web technology to their courses (Cole and Foster 2007). Moodle has been touted to be the most widely used open-source CMS in the 21st century offering a wide range of functions to support interactive and effective learning (Anuratha 2019). Moodle offers online tools to: upload and share materials, such as videos and presentations; hold online discussions and chats; give quizzes and surveys; gather and review assignments; create wikis, lessons and blogs; and record grades (Cole and Foster 2007). Many HEIs have adopted Moodle (Aikina and Bolsunovskaya 2020) as an effective online learning tool (Estacio and Raga 2017). In fact, in a recent study comparing students' preferences for learning tools, Moodle was rated as the top learning tool (Jeljeli, Alnaji and Khazam 2018). However, Aikina and Bolsunovskaya's (2020) study reported that whilst Moodle has been perceived to be an effective online tool, it also created some challenges pertaining to technical issues such as internet connectivity, uploading and downloading materials, amongst other issues. Conversely, Moodle has not been perceived as an effective learning tool but rather as a document repository (Papadakis et al. 2018).

In a recent Ghanaian study on online learning during the Covid-19 pandemic, whilst students had positive perceptions towards learning tools such as Moodle, they were, however, neither prepared nor ready for online learning due to factors such as connectivity problems and lack of experience with these tools, amongst others (Agormedah et al. 2020). Interestingly, it was found that a lecturer's readiness with Moodle and helping students to navigate through the various functions positively impacted students' engagement with Moodle and vice versa (Xu and Mahenthiran 2016).

Self-efficacy and Online Learning Readiness

Bandura (1997, 3) defines self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments". When looking into the need for studying self-efficacy in online learning, the extant literature revealed that self-efficacy and student performance in a fully online learning environment may not be more successful than in a hybrid learning environment. Therefore, there is a need for

further investigation into the role of self-efficacy in online learning environments in order to explore the full impetus of this mode of learning (Alqurashi 2016, 49).

A previous study by Doe, Castillo and Musyoka (2017, 1) examined undergraduate students' online readiness using a custom designed research instrument to measure students' perception of "information communications technology engagement, motivation, self-efficacy and learner characteristics". This study measured students' technological self-efficacy in terms of students' comfort level; confidence and attitude in adopting technology; ability to operate technology independently; early adoption of new technology; and perceived benefits of technology usage.

According to Chung, Noor and Mathew's (2020, 302) study investigating self-efficacy and online readiness in a university environment, students' readiness was "high in computer and internet self-efficacy, moderate for self-directed learning and motivation for learning, and low for learner control".

A study by Warden et al. (2020) examined the relationship between differences in technology readiness to students' self-efficacy, engagement and achievement in an online class. The findings revealed that students were self-confident in completing technological tasks irrespective of their level of technology readiness. However, an interesting finding was that students who were less comfortable with technology, reported lower self-efficacy in academic social interactions with their fellow students.

Factors Influencing Self-efficacy

The results of a systematic literature review by Peechapol et al. (2018, 75–78) revealed that "online learning experience and knowledge, feedback and reward, online communication and interactions, social influence, and learner motivation and attitude" influenced self-efficacy in an online learning context. Based on the findings, the authors claimed that self-efficacy was a key success factor in online learning.

Students' self-efficacy has been found to play a significant role in their engagement with and participation in online resources (Bubou and Job 2020), as well as with their perception of online readiness (Cadet 2017). In ensuring success in online learning, therefore, it is essential to explore students' self-efficacy belief in regulating and monitoring their own learning process, and how their self-efficacy belief predicts their learning achievement in the online learning environment (Teng, Wang and Wu 2021, 2).

Student Satisfaction

According to Ilgaz and Gülbahar (2015), satisfaction of online learners is a key determinant of the success of a course in relation to its instructor, selected technologies and design. Based on the numerous studies that have reported on student satisfaction with online learning, it is noteworthy that there are various factors impacting student satisfaction which are listed as follows:

- Self-efficacy with different types of technology, computers, and the internet positively impacted student satisfaction (Wei and Chou 2020).
- Learner content interaction impacted student satisfaction positively (Alqurashi 2016, 49), for example, on Moodle.
- The well-designed components of a course can positively impact students' positive emotions, such as satisfaction (Ghaderizefreh and Hoover 2018), and consequently for an online learning tool such as Moodle.
- Student dissatisfaction was related to a lack of internet connectivity (technical issue) and problems with lecturer attachment and guidance (learning tool) (Surahman 2020).
- Social presence was positively correlated with student satisfaction (Horzum 2017; Wijaya et al. 2021), for example, online learning tools such as Moodle and Zoom.
- Interaction between students as well as student engagement related positively with student online learning satisfaction (Muzammil, Sutawijaya and Harsasi 2020).
- Significant predictors of student e-learning satisfaction were "computer self-efficacy", "internet self-efficacy", "online communication self-efficacy", "self-directed learning", "learner control" and "motivation towards e-learning" (Yilmaz 2017).

Migration into Online Learning amidst the Covid-10 Pandemic

Without question, the global spread of Covid-19 has posed a challenge to the higher education landscape with great magnitude together with the emergence of technology supported and online instruction (Liguori and Winkler 2020, 2). Many HEIs which were earlier reluctant to change their traditional pedagogical approach, had no option but to shift entirely to online teaching and learning (Dhawan 2020, 1). Online learning readiness has been shown to be a contemporary measure of success in online learning (Liu 2019). One of the earlier studies undertaken in online readiness in the 1990s addressed vocational education and training in Australia (VET) (Warner, Christie and Choy 1998). A number of terms have been used to describe online learning, such as distance learning, blended learning and e-learning (Howard et al. 2021, 142). Singh and Thurman (2019) conducted a systematic literature review of online learning definitions over three decades (1988–2018) and found 46 definitions from 37 resources, with several variations. In trying to consolidate the various definitions of online learning in order to arrive at a common definition, Singh and Thurman (2019, 303) propose a few definitions, one of which is:

Online education is defined as education being delivered in an online environment through the use of the internet for teaching and learning. This includes online learning on the part of the students that is not dependent on their physical or virtual co-location. The teaching content is delivered online and the instructors develop teaching modules that enhance learning and interactivity in the synchronous or asynchronous environment.

Online learning can be termed a tool that can make the teaching-learning process more learner-centred, more innovative and more flexible. Online learning is defined as "learning experiences in synchronous or asynchronous environments using different devices which includes mobile phones, laptops and tablets with internet access" (Singh and Thurman 2019 cited in Dhawan 2020, 2–3).

Covid-19 has impacted teaching and learning not only in South Africa, but throughout the world. The impact of Covid-19 has resulted in the "largest online movement in the history of education" and the prediction by experts as the "new normal in learning" in the future of education (Chung, Subramaniam and Dass 2020). Whilst there are challenges faced with online learning during Covid-19 (Aboagye, Yawson and Appiah 2021; Ali 2020; Chung, Subramaniam and Dass 2020) particularly in a South African context, in relation to differences in resources amongst students (Pather, Booi and Pather 2020), distance learning technology is nevertheless the "best make-shift solution" (Qazi et al. 2021, 2) together with an emergency approach for dealing with online remote learning (Agormedah et al. 2020).

The extant literature documents various types of questionnaires that are used to measure students' online readiness as well as key constructs, as depicted in Table 1. However, as is evident in Table 1 and according to Liu (2019), most of the measuring instruments pertaining to online readiness focus on technology and the students' independent studying practices.

Table 1: Recent studies documenting key constructs used in measuring online readiness

Author/s	Number of items measuring online readiness	Constructs measuring online readiness
Al-Nofaie (2020, 9–10)	10	"Computer skills" and "availability of online support and facilities"
Budur, Demir and Cura (2021, 183)	24	"Resource readiness, cultural readiness, strategic readiness, IT readiness, innovation valance, cognitive readiness, partnership readiness, and readiness in general"
Linjawi and Alfadda (2018, 855)	34	"Technological access, computer skills, online skills, and motivation level in using e-learning for personal and learning purposes; and overall readiness for e-learning adoption"
Liu (2019, 45)	20	"Technical competencies, social competencies with instructor, social competencies with classmates, communication competencies"
Martin, Stamper and Flowers (2020, 47)	20	"Online student attributes, time management, communication, and technical"
Pather, Booi and Pather (2020, 9756)	Unknown	"Demographics; device ownership; capability of the device to connect to the internet; the status of internet connectivity at their place of residence; other means to access the internet in a post-lockdown period; student preference of device for online learning tasks; access to affordable internet; conduciveness of the home environment for learning; and level of confidence to engage in learning via online means"
Rafique et al. (2021, 4)	18	"Computer/internet self-efficacy, self-directed learning, learner control, motivation for learning, and online communication self-efficacy"
Smith, Murphy and Mahoney (2003, 57)	13	"Comfort with e-learning" and "Self-management of learning"

Post-Covid-19 Era and the New Normal: Implications for Online Learning in Higher Education

The swift take-over of learning in higher education through an exclusive online mode during the Covid-19 pandemic has placed a new spin on how one perceives and constructs teaching and learning for the future. Whilst several crisis interventions were considered to ensure disaster risk reduction and upscaling an integrated and learner-centred approach

amidst various teaching modalities, the Covid-19 pandemic can be seen as an accelerator of the learning processes and structures that were placed in motion over something so inevitable and without consultation, forming the most logical path in a time of crisis (Tesar 2020, 556).

Online teaching and learning together with students' readiness went from face-to-face classes to an online space on the assumption that greater accessibility for this mode of learning would grow astronomically, calling for greater consideration to make it work more effectively (Tesar 2020, 557). In the post-Covid-19 era, students must adapt to the changing market conditions and remain agile, whilst instructors must innovate to make learners think and thinkers learn.

Challenges with Online Learning

The learning process in online learning may at times not reach its full potential until learners have practised what they have learnt. Online content may be seen by learners as theoretical and accordingly not allowing them to practise what they have learnt effectively. At times, learners experience technical problems and difficulties in understanding instructional materials, which could be seen as barriers to online learning (Song et al. 2004 cited in Dhawan 2020, 4). Another important factor could be attributed to the fact that the students are already attached to the conventional approach (Aboagye, Yawson and Appiah 2021: 6). Online learning has the potential to be time-consuming and flexible but requires personal attention from learners. However, various learners experience difficulties in not being sufficiently prepared for balancing their family, other commitments and social lives with their studies. Further, online learning competencies and low-level preparedness for use of online CMS can also prove to be daunting experiences for learners (Dhawan 2020, 4).

Methodology

The current empirical study followed various methodological aspects. The study was quantitative in nature and attempted to understand the importance of students' online readiness during the Covid-19 pandemic. Problems and challenges as well as positive outcomes associated with online learning were explored whilst solutions were canvassed through the empirical research and other scholarly studies in this regard.

Study Population

The target population under study comprised students within the School of MIG in 2020 who were enrolled for modules offered by the school on different campuses. The unit of analysis was a student's perceptions of relevant aspects of online readiness. The choice of population was based on the fact that the School of MIG is one of the largest schools in UKZN and undertook remote online teaching and learning on a large scale for the first time.

Sampling

Due to the lack of a sampling frame, the study employed a non-probability convenience-based, purposive sampling method. A disadvantage of this sampling method employed is that its results cannot be generalised to the population as a whole. Hence, the study findings and any inferences based on them would apply only to the sample studied.

A message was placed on the UKZN internal mail system to students providing information about the study and requesting participation from those interested students within the School of MIG. The sample, therefore, was populated by those students who were willing to and consented to participating in the study who completed the online questionnaire. A total of 400 students participated in the study and consequently made up the sample.

The majority of the sample (over 75%) comprised students in the age categories 20–21 years (39,8%) and 17–19 years (35,5%), respectively, followed by the age group 22–24 years (16,3%). Students over 24 years of age made up the smallest portion (8,5%) of the sample, and the majority of them were from the Westville campus.

Data Collection

Data was collected using a structured questionnaire, which was placed on the UKZN notice system and was accessed via a link provided in the notice. The questionnaire was designed by considering how other researchers have measured the variables and constructs under study from an extensive literature review. The questions pertaining to the online readiness constructs were measured using a 5-point Likert scale. The questionnaire was pilot tested with academics who possessed extensive experience and knowledge in the study area, including a statistician. UKZN ethically cleared the questionnaire before the collection of data began.

In essence, the data collection took the form of a survey where students who participated completed and submitted the questionnaire online. This was considered as a feasible method during the Covid-19 restrictions, which limited human contact and lent itself to the collection of large amounts of data, which is commensurate with the quantitative approach that the study adopted. To keep the data collection free from bias, participants were not offered any incentives to complete the questionnaire.

Measurement of Constructs under Study

The main constructs under study were measured on a 5-point Likert scale based on levels of agreement/disagreement. Technical requirements for online learning were measured using five questions adapted from Doculan (2016, 3). Engagement with learning tools available on Moodle was measured using 14 questions adapted from Cole and Foster (2007). Characteristics of Moodle as a CMS for online learning was measured using 10 questions adapted from Padayachee (2017) and Anuratha (2019). Perceptions of

technological self-efficacy were measured using six questions adapted from Hung et al. (2010, 1085) and Kirmizi (2015, 133).

Table 2: Cronbach's alpha values for the constructs under study

Construct	Cronbach's alpha
Technical requirements for online learning	0,799
Engagement with learning tools	0,938
Characteristics of Moodle as a CMS for online learning	0,930
Perceptions of technological self-efficacy	0,906

According to Table 2, all the constructs under study had a Cronbach's alpha value greater than 0,7 thereby indicating good reliability.

Findings and Discussion

The study findings reported here pertain to students' readiness for online learning with particular reference to technological issues and their satisfaction with online learning at a UKZN in South Africa. The study was performed during the 2020–2021 academic year when online learning commenced full scale in higher education amidst the Covid-19 pandemic.

Demographic Profile of Participants

The majority of the participants (39,8%) were in the age group 20–21 years as presented in Figure 1. Female students made up the majority of sample (59%) as shown in Figure 2, whilst second year students comprised the bulk of the sample (37,3%) as shown in Figure 3.
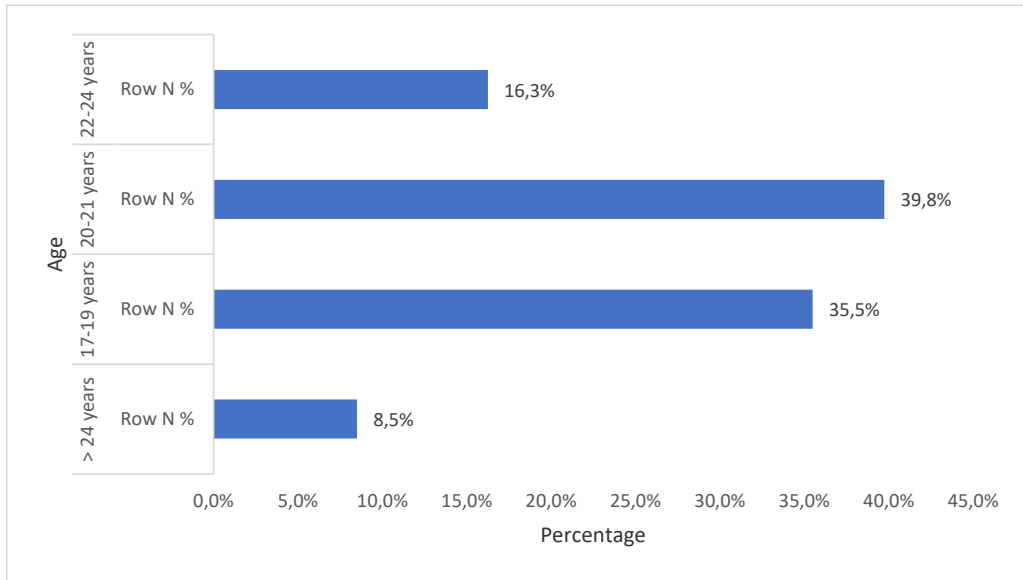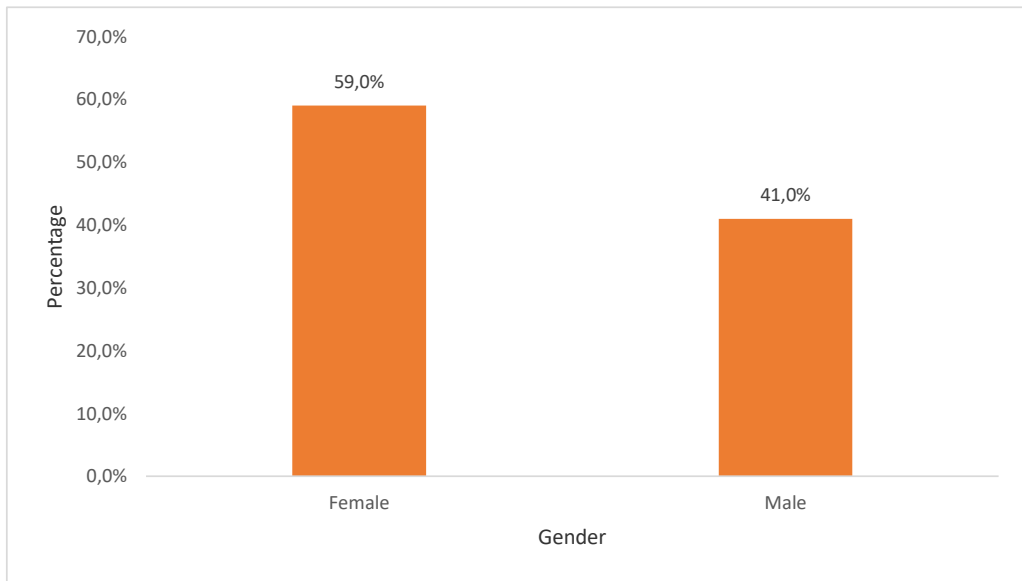
Figure 1: Age breakdown of participants

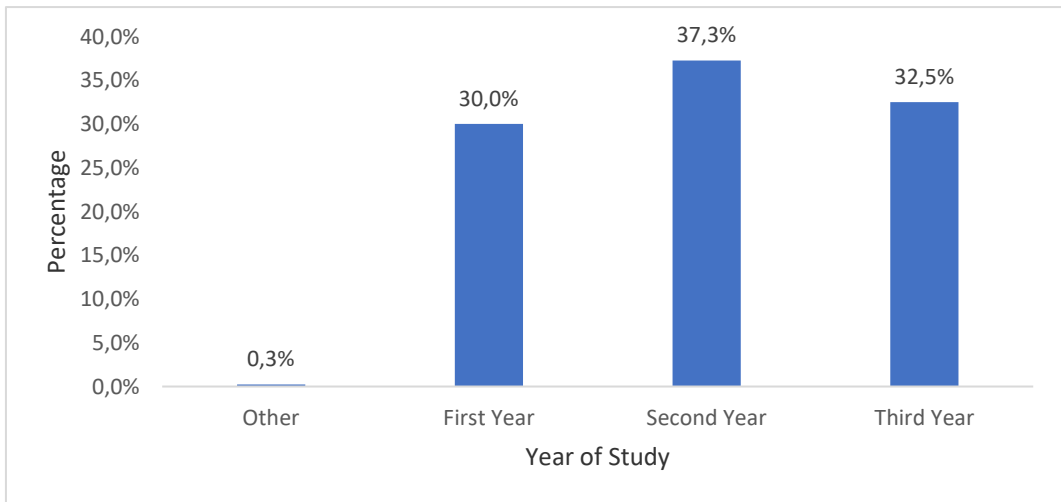**Figure 2:** Gender breakdown of participants

Figure 3: Year of study breakdown of participants

Figure 4 shows the different levels of agreement/disagreement regarding the technical requirements for online learning. For question 8.1 (reliable electricity), 52,1% of the students indicated that they had reliable electricity, whilst just over 20,3% had unreliable electricity for online learning. For question 8.2 (adequate network coverage), 40,6% of the students indicated that they had adequate network coverage, whilst 23.1% indicated that they did not have adequate network coverage. Responses for question 8.3 (reliable internet connectivity) showed that 33,9% of the students had reliable internet connectivity, while 27,3% had unreliable internet connectivity. Regarding UKZN data packages (question 8.4), 58,4% of the students felt they had adequate data, whilst 21% thought they did not have sufficient data from UKZN. Regarding access to specialised software, 36,9% of the students indicated that they had good access to such software, whilst 33,1% seemed not to have adequate software access. The findings on access to technological requirements supported the claim made by Ilgaz and Gülbahar (2015) that the most critical aspect related to participants' readiness was access to technology for online learning from their homes, or any other place, through the use of computers with appropriate hardware and software.
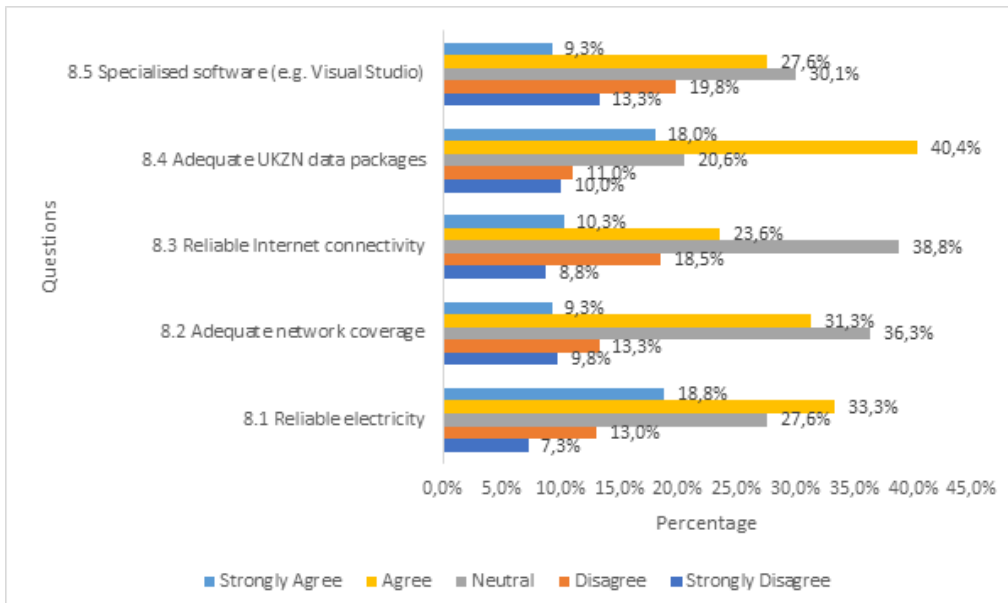
Figure 4: Technical requirements for online learning

Figure 5 addresses various issues pertaining to student engagement with learning tools. High percentage values for "agree" and "strongly agree" indicate a positive engagement with the listed learning tools. The students seemed to be most ready for downloading resources, such as slides and notes (Q9.1); taking online quizzes (Q9.8); reading online material (Q9.2); uploading assignments (Q9.6); and taking surveys (Q9.9). On the other hand, the students seemed to be least ready to share files (Q9.12); and participate in discussion forums (Q9.11). The findings were similar to those reported by Hasan (2017) who indicated that the features most frequently used included: downloading learning resources, namely, course outlines, presentations, books and assignments; uploading assignments; and communicating with the teachers using messages.
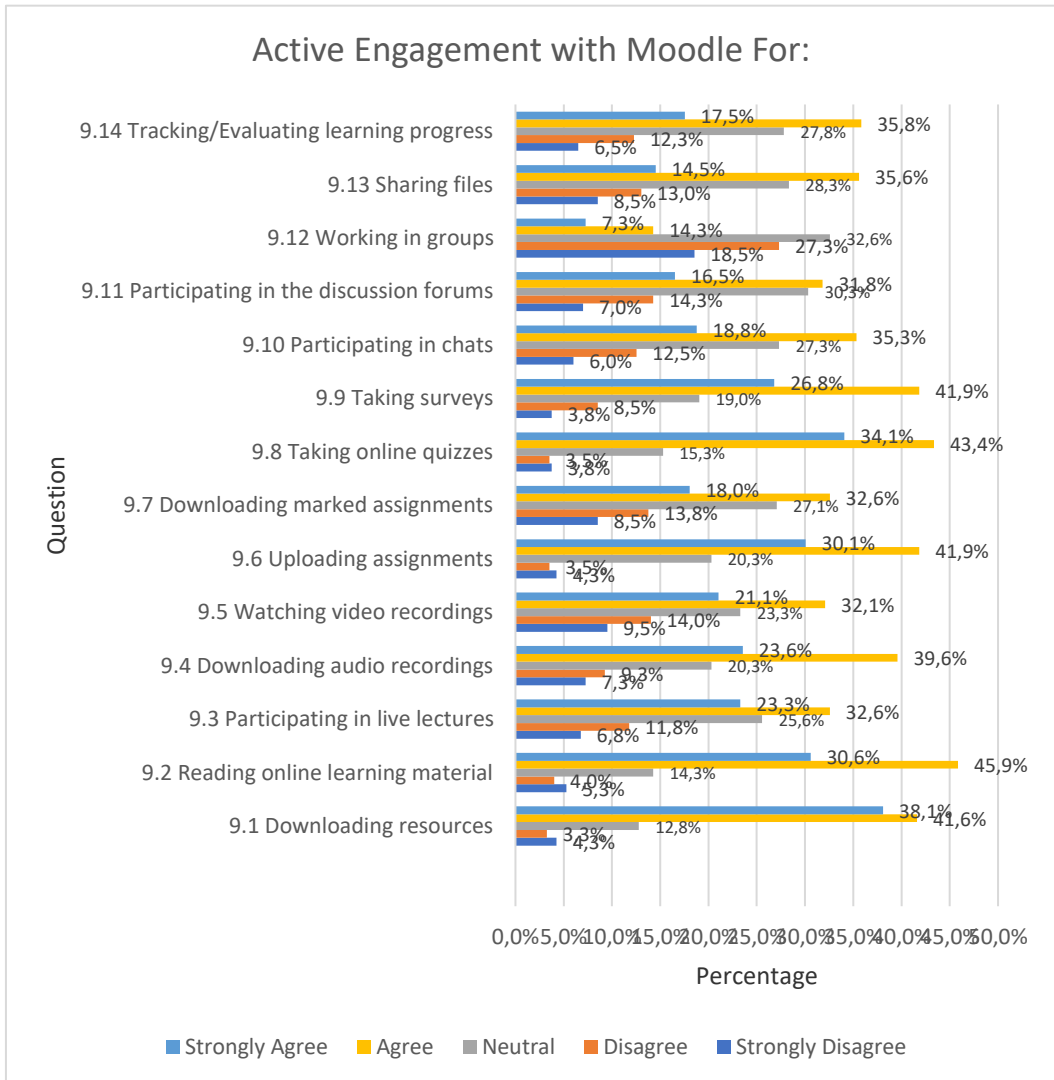
Figure 5: Engagement with learning tools

Figure 6 addresses various issues pertaining to Moodle characteristics for a CMS. High percentage values for "agree" and "strongly agree" showed a positive perception with Moodle characteristics for each question. It was noteworthy that most students seemed to be able to engage effectively with Moodle as a learning tool. More particularly, the use of Moodle was perceived as easy to understand (Q10.4); it was secure due to password usage (10.2); it was flexible (Q10.6); and it did not require much effort (Q10.5). However, some areas that needed attention in improving student readiness were: where responsiveness issues pertaining to Moodle could be improved on, for example, when performing functions such as uploading and downloading files and taking online tests (Q10.8); and

where Moodle could be better integrated with other tools such as Zoom and Kaltura (Q10.7). The findings of students' perceptions of the characteristics of Moodle concurred with the lecturers' perceptions of the importance of quality characteristics of security, reliability, efficiency and flexibility offered by Moodle (Padayachee 2017).
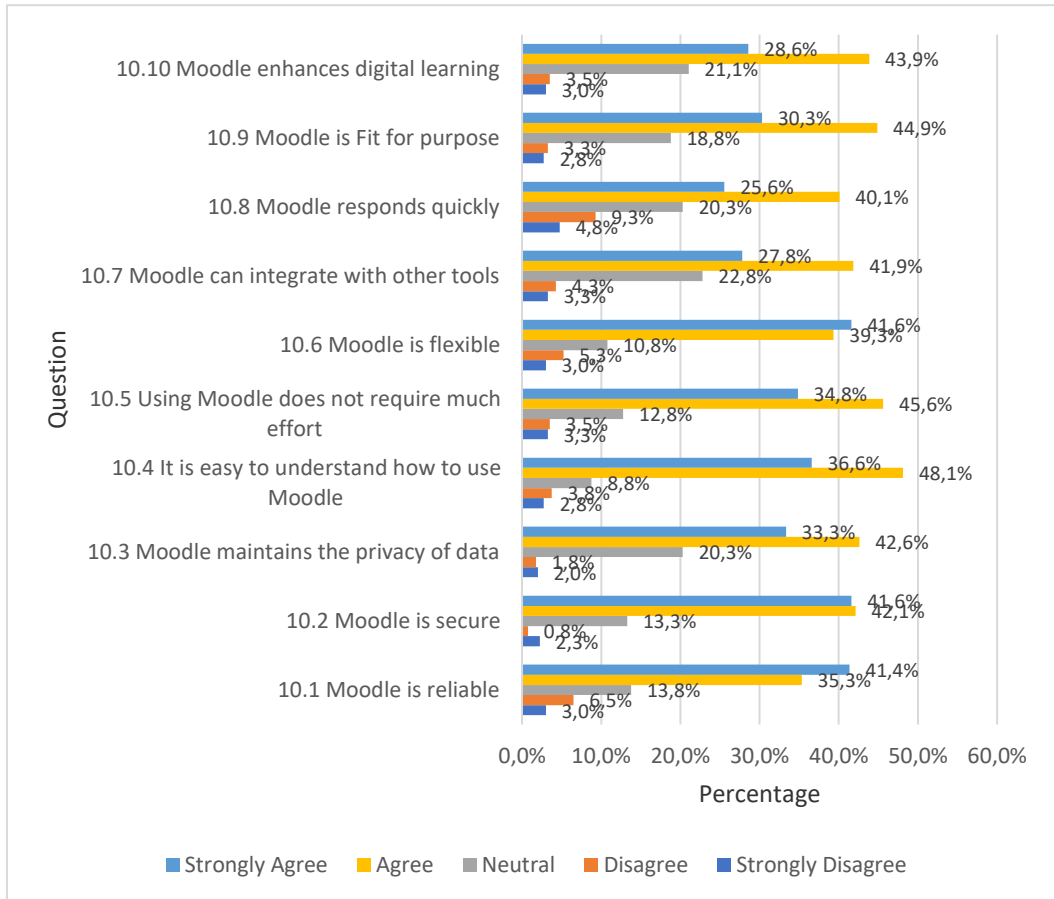

Figure 6: Moodle characteristics for a CMS and online learning

Figure 7 outlines students' perceptions of technological self-efficacy. High percentage values showed a positive perception of technological self-efficacy for "agree" and "strongly agree" for each question. Consequently, the students seemed to have an affinity for embracing new technology in accomplishing goals (Q12.6); were comfortable in adopting new technologies (Q12.4); and were confident in using electronic technology (Q12.5). However, the students were not among the first in their circle of friends to acquire new technology when it appeared (Q12.2). This finding concurred with the study conducted by Lee and Mendlinger (2011), who reported that perceived self-efficacy is important for online learning acceptance.
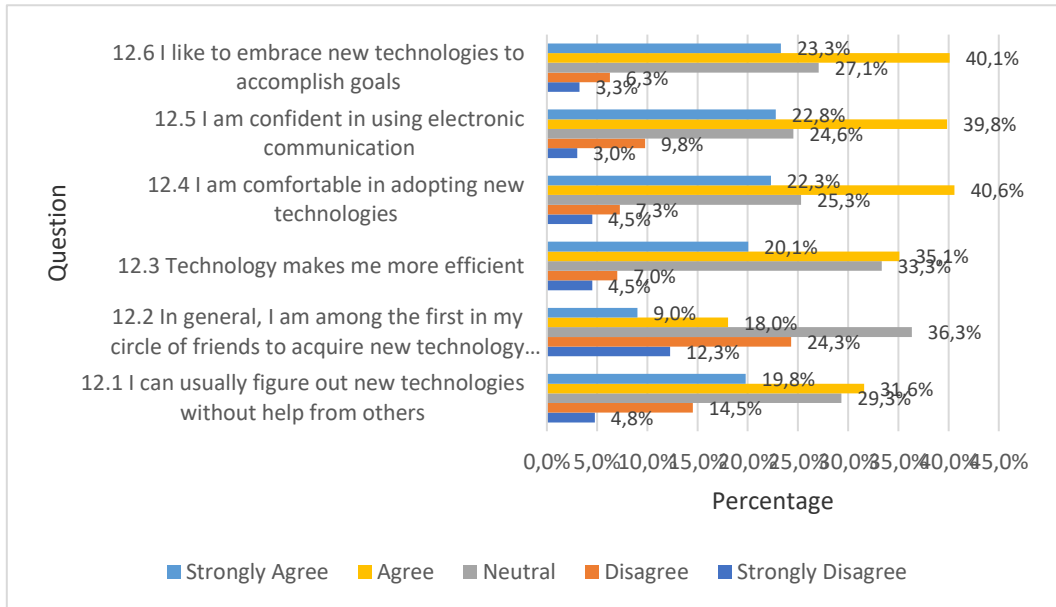
Figure 7: Perceptions of technological self-efficacy

Based on the information provided in Figure 8, it was recorded that 26,6% and 20,3% of the students agreed and strongly agreed, respectively, that they were satisfied overall with online learning (Q13.1). This indicated that less than 50% of the students were satisfied with online learning. In addition, more than 50% of the students were dissatisfied with online interaction (Q13.4). Moreover, more than 50% of the students indicated that in the future, they would not be willing to take fully online courses at UKZN again. Nevertheless, more than 50% of the students believed that online courses contribute towards their educational and professional development. The findings were similar to those reported by Ilgaz and Gülbahar (2015), who indicated that participants were satisfied with the instructional content, communication, usability and teaching process aspects of online learning. Furthermore, learner content interaction impacted student satisfaction positively (Alqurashi 2019), for example, on Moodle.
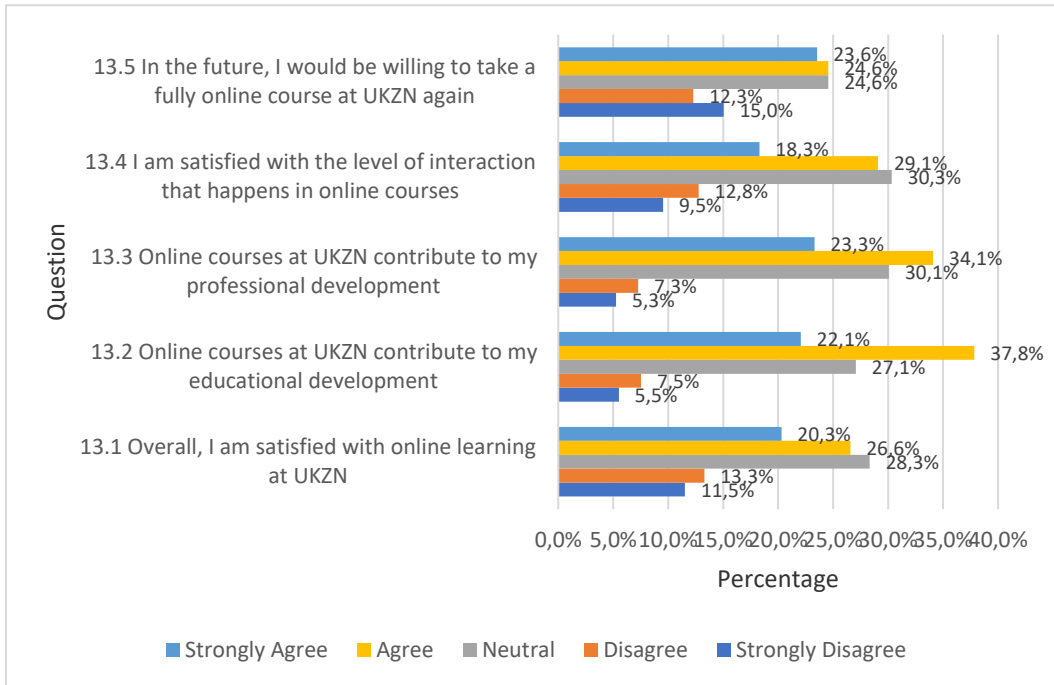
Figure 8: Satisfaction with online learning

Limitations of the Study

The participants were drawn from only one school within the College at UKZN, namely, the School of MIG. Whilst the study is useful in gaining insight into students' experiences with digital readiness and online learning, it is possible that those who felt greater distress may not have responded to the survey.

Recommendations

The sample of students for the study was limited to one school within the College at UKZN. Therefore, it is recommended that the study be extended to other schools and colleges university-wide in particular, and to other HEIs in general, in order to obtain a more in-depth analysis of an online environment of higher education. Herein lies the avenue for further research to be undertaken. Whilst the study focused on students' online readiness within the Covid-19 pandemic, it is envisaged that, in the "new normal", UKZN and other HEIs in general would consider designing future courses considering students' expectations whilst increasing interest in online learning as an imperative for continuous availability and flexibility.

Conclusion

Methodologically, the study drew on 400 students' responses to a descriptive research design questionnaire to collect data from convenience-based purposive sampling. The

empirically approved study explored the students' perceptions of online readiness relating to the impact of and their approach to teaching and learning in the selected higher education environment.

The participants were drawn from undergraduate students in the School of MIG to assess intrinsic and extrinsic factors influencing their online readiness with respect to their technical requirements; engagement with learning tools and resources; digital readiness; and overall satisfaction with the Moodle online learning tool. The theory, method and outcomes present the main areas examined to assess intrinsic and extrinsic factors influencing students' online readiness with respect to their technical requirements; engagement with learning tools and resources; digital readiness; and satisfaction with the Moodle online learning tool.

The research findings are significant in that they have implications for students' university readiness levels in terms of improving their digital readiness by adopting creative pedagogies for online teaching and learning in order to promote active student engagement in and overall satisfaction with online learning. The results also highlighted the needs of the *readiness* for technological infrastructure as the participants raised challenges with regard to adequate network coverage and reliable internet connectivity, which has implications for higher education to extend the reach of online education to historically disadvantaged students. Finally, the study findings have implications for software developers to improve the software quality characteristics of Moodle to support interoperability with diverse learning tools and resources.

Declaration of Conflicting Interests and Funding

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