Navigating the dark: understanding the impact of load-shedding on Learning Management Systems (LMS) in South African Universities

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ABSTRACT

This qualitative study investigated the forte of load-shedding on the gains of digital technology integration in a selected South African university in Gauteng province. This case study made use of interviews which were conducted using MS Teams among 8 lecturers and 8 students that were selected purposefully. The interpretive paradigm was used to understand the participants’ plight in the reversal of gains that load-shedding continues to bring in their university post-COVID-19 outbreak. The complexity theory was used to underpin the study and the main findings revealed through themes that both the students and lecturers struggle with the learning and teaching activities that need digital tools because of the persistence of load-shedding that affect innovation and skill impartation. It was also revealed that modems that are used as internet sources fail to function during load-shedding because the network is often affected when lights are off. The study recommends that South African universities should invest in renewable energy and resort to an uninterruptible power supply to keep the lights on. All the role-players of ESKOM need to pull in one direction to have a lasting solution that should keep the lights on for digital tools to keep working.

Introduction

The outbreak of the COVID-19 pandemic brought the best out of many educators, particularly in technology integration inside their classrooms. Tam and El-Azar (2020) postulated that the COVID-19 pandemic brought three major effects on the education landscape. These effects are the Education system that is nudged and pushed to change to surprising innovations; public-private educational partnerships that grew in importance and the widening of the digital divide which exposes inequality realities in South Africa. Being that it may, universities had to resort to their Learning Management Systems (LMS) and other technology means to keep the teaching and learning activities going during the outbreak of the pandemic. An LMS supports an inclusive learning environment for academic progress with interceding structures that promote online collaborative groupings, professional training, discussions, and communication among other LMS users (Bradley, 2021). This then needed an uninterrupted electricity supply and a lot of immediate technology integration training for both the lecturers and students that was put in place for the smooth transition of the teaching. During the outbreak of the pandemic in 2020, the hardest part was that learning and teaching had to continue while human life needed to be preserved. According to Sari and Keser (2021), countries within their contexts took a series of decisions to minimize the impact of the global pandemic on social life and to prevent further spread of the pandemic. This then ensured that technology integration was incorporated into many facets of teaching and learning activities, while everyone remained safe from the pandemic. While education was being managed through online teaching and learning in many institutions of higher learning and other education departments in South Africa, the issue of power cuts intensified and became a newer pandemic for the country to deal with. Load shedding does not only disrupt livelihoods and put lives in danger by maintaining the dark at night, but it reverses the gains that digital technology brings, particularly in teaching and learning.

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Even though ESKOM, which is the national electricity supply company, used to generate about 95% of the electricity used in South Africa (Drian and Mart-Mari, 2016) there seem to be serious challenges in the supply of electricity to the citizens lately. ESKOM has been battling with the imbalance between the demand and supply of electricity since 2007, which compelled them to implement load-shedding for all customers; however, load-shedding has become more severe since 2019, when South Africa began to see a higher stage of load shading for the first time, such as stage 6 (Mabunda et al., 2023). This had a serious effect on the running of educational institutions, especially considering the use of digital tools like LMSs. South Africans spend many hours in the dark because of load shedding that continues to grapple the country. This then affects optimal operations of many institutions including the teaching and learning institutions. Even though universities have various LMSs at their disposal, without power, these LMSs fail to be used. As such, teaching and learning get stalled in many universities particularly those in townships that do not have backup generators that should kick in during power cuts. An LMS has multiple online operations and behaves as a framework to capture numerous layers of progressive learning (Jung and Huh, 2019), Kuosa, et al., (2016), Watson and Watson (2012). An LMS behaves as a platform to distribute and oversee pedagogical material (Watson and Watson, 2012). This comes with a lot of training for anyone using it. LMS functions include promoting specially designed information for capturing learner progress in meeting expectations (Tam and El-Azar, 2020). Since many universities have invested in the training of lecturers and students in using their institution’s LMS, load-shedding disrupts such advancements. This is worsened by the many lecturers and students failing to resort back to the old ways of teaching and learning where the use of a whiteboard with its markers, chalkboard, etc. seems outdated because of the benefits that come with using the LMS (Drian and Mart-Mari, 2016). It is within this premise that this study aimed to find out how load-shedding affects the gains of using the LMS (digital technology), which came into full swing during the outbreak of the COVID-19 pandemic. The study has the following sub-research questions:

1. What is the impact of load-shedding on teaching and learning at South Africa’s Universities?
2. What qualifying factors are needed to sustain the use of LMS in universities during load-shedding?

Literature Review

The outbreak of the COVID-19 pandemic became an opener to many educational institutions the world over. It (COVID-19) pushed for the transition of teaching and learning activities through the intensification of technology integration. In Turkey, the transition to asynchronous learning environments was initiated through broadcasts of the local Education Information Network (EBA) within the Ministry of National Education (MoNE) on the Turkish Radio and Television (TRT) on March 23 at all levels of education (Ministry of National Education (Ministry of National Education, MoNe, 2020a). Within the scope of the decisions taken after the recommendations by the Scientific Committee of the Ministry of Health, it was decided that Turkish education would be conducted asynchronously firstly until April 30 (Ministry of National Education, MoNe, 2020b) and later until May 31 (Ministry of National Education, MoNe, 2020c). This practice further spread to many parts of the world to sustain the teaching and learning activities. Unlike 100 years ago, when the Spanish flu hit the world, Australia was exposed to school closures where little schoolwork was done because of a lack of technology (Maher, 2021). However, during the outbreak of COVID-19, there was a huge difference between what happened 100 years ago and. The major difference was that in Australia, like in many other well-resourced countries, the use of the Internet to support remote learning was already in place (Maher, 2021). Whilst access to the internet varies across countries, developed countries have high levels of access to the internet. In Australia for example, according to the (Australian Bureau of Statistics, 2018), 97% of households with children under the age of 15 had internet access at home. This means that the issue of electricity and connectivity is not a problem. In Lesotho for instance, the Lesotho Distance Teaching Centre (LDTC) used radio stations to maintain teaching and learning. The LDTC increased the number of radio programmes during the COVID-19 pandemic school closures for both formal education and out-of-school learners at the basic education level (Noone, 2013). This was the case in Namibia where the educational radio lessons/tutorials, which are meant to help students understand content to perform well in examinations and provide general motivation and study skills (Bozkurt, 2019), were kept alive during the COVID-19 pandemic. However, this level of access is not consistent across all households, but it is better than in many countries (Maher, 2021). This is somewhat the same as in South Africa because of the uneven society in the country, but it varies on issues of connectivity and other issues like the digital divide that the country has. The issue of using technologies like radios and Television (TV) was emphasized by the minister of the Department of Basic Education (DBE) in South Africa where a variety of TV and radio programmes started to be aired. However, such devices needed electricity to function, and that made things even worse because the issue of power cuts does not make things easy. After all, during load shedding, even the technological gadgets fail to operate. The issue of network connectivity, and power to operate gadgets like laptops, cell phones, and desktops, is continuing to be worrisome. This then makes many universities stop teaching immediately when power goes off because the LMS would be down and resorting to the old ways of teaching becomes no option. After all, the face of classrooms has changed to accommodate digital tools.

Authors like Erero (2023); Kpodar and Liu (2021), have noted how load-shedding has affected the livelihoods of many families, learning institutions included. According to Erero (2023), since the beginning of load-shedding one decade ago, the level of life of South Africans has never been the same again. Both industries and households have accepted the new normal of living without electricity for several hours or days. Load-shedding has negatively affected families, firms, and the entire economy of the country (Erero, 2023). Some firms have wasted worthwhile working hours instead of producing goods and services due to a lack of electricity.
(Erero, 2023). To add to that, the sectors that afford the backup generators struggle to keep them whining because of the steep fuel prices that keep rising. In fact, according to Kpodar and Liu (2021), understanding how and by how much changes in fuel prices (for backup generators for example) affect consumer price inflation, and the differentiated impact on households, is not only critical for policymaking but also for the sectors that need business operating, universities included. Despite countries having recovered from the COVID-19 pandemic, there continue to be inflationary pressures, which in universities, affect digital technologies and integration (Kpodar and Liu, 2021).

According to Erero (2023), South Africa seems to be experiencing for the first-time unending load-shedding encounters. This recurrent phenomenon is worsening because the power utility often cries foul for the loss of a generation of power because of the ailing infrastructure that continues to collapse and the steep diesel prices that the sector needs to sustain power generation. This infrastructure then continues to deteriorate and is unable to generate electricity because the electricity generation infrastructure requires not only replacement but also diesel which is worth billions (Findt, et al., 2014). In the year 2019 alone, the SA economy was affected at a value of R120 billion as espoused by the Council for Scientific and Industrial Research (CSIR, 2020). This is due to the blackouts that continued for a total of 1,352 GWh – or 530 hours in 2019 alone. Nonetheless, when compounding the effects of load-shedding dating back from 2007 to 2022, the overall economic effect over the period is about R338 billion (Erero, 2023). This has surely had and continues to influence the gains made in technology integration in the HEIs and many other sectors. As indicated earlier, South Africa is confronted with the persistent and worsening load-shedding which has become a new normal with daily power cuts that are affecting all sectors of the economy and society. These persistent electricity cuts resulted in 2022 being the beginning of South Africa’s most unpleasant year for load-shedding with 208 days of power cuts compared to 75 days in 2021 and has continued into 2023 with each day of the new year having load-shedding with higher stages up to stage 6 (Erero, 2023). These days amount to the approximate days that teaching and learning needs in universities, meaning that many days in the university sector were spent without electricity. According to Dewa et al., (2020), there is only 13% of electricity consumption by the commercial sector which includes the HEIs. Much as this can be seen as little as compared to the 46% of the power consumption by the manufacturing sector, the results of the shutting down of the 13% in the commercial sector are massive. This phenomenon sees many HEIs knocked off early because there are no backup generators to keep online teaching and learning afloat. This is sad when some of these institutions are the so-called universities of technologies which were supposed to have been the leading example in technology integration. Much as the power cuts are said to be necessary to “ensure that lights are kept on” in other places, the functioning of cell phones, laptops, and other technological tools is brought to a complete stop, thus making life go back to two decades. This study therefore aimed to find out how load-shedding affects the gains that came with digital technology in using the LMS in a selected South African university, which came into full swing during the outbreak of the COVID-19 pandemic.

The challenges of load-shedding are new and are spreading like wildfire. However, studies on challenges and the impact of load-shedding have not been explored fully especially in the context of higher education and the effects that they have towards the use of LMSs. Therefore, the theoretical framework for this study was the complexity theory which was used to bring into context the impact that load-shedding has on the gains of digital technologies. This theory holds that organisations are made up of interconnected and well-structured parts and the decision or action of one component affects the other (Park and Jo, 2017). Thus, a goal of complexity theory is to understand how parts of the system interact, and how they change over time, emphasises how systems tend to evolve in a nonlinear fashion and how feedback loops affect the evolution system (Rosenhead, et al., 2019). According to Mabunda et al., (2023), the complexity theory exposes that organisations that are inclusive of higher education institutions operate in a complex internal and external system. According to the results of their study, Mabunda et al., (2023) claim that small businesses operate within internal systems consisting of input, transformation, and output. This is not immune to the South African universities which find themselves having the same challenges as the small business. In addition, small businesses operate within an external system consisting of the government, which includes the national, provincial, and local government (municipalities), suppliers, Eskom, customers, and the community at large. Therefore, if the latter (external systems) do not operate optimally, the other beneficiaries like the South African university in this instance are bound to feel the brunt. The theory states further that a decision made in one component affects the whole system (Lai and Huili Lin, 2017), (Rosenhead, et al., 2019).

This study agrees with the theory by pointing out that Eskom’s load-shedding, which disrupts not only the small businesses’ manufacturing processes (Mabunda et al., 2023), continues to make many sectors, inclusive of South African universities, dysfunctional. As a result of load-shedding, digital tools, LMSs, and many other online teaching and learning devices, are put to a halt which causes a major interruption in the classrooms. As a result, South African universities, like many other teaching and learning sectors that have made strides in online and teaching methods, are no longer able to play an effective role in meeting Generation Y’s interest in being digital natives. This goes beyond the classroom because even the address of socio-economic challenges such as unemployment, poverty eradication, and inequality, which prevent government policies from achieving their goals of economic development, through the mastery and adoption of the 4IR, get stalled (Mabunda et al., 2023). The significance of load-shedding to teaching and learning institutions is not a favorable one. The digital tools that the universities have, which came into being during the outbreak of COVID-19, become dysfunctional when electricity is cut off because they rely mainly on electricity for them to be functional and to be able to connect to the network. This then makes load-shedding a newer pandemic that affects the gains that came with digital technology integration.
Research Methodology

This is case study research because the study investigated how load-shedding affects the gains made by digital technology during the outbreak of COVID-19 in a particular South African university in Gauteng province. Creswell (2014) defines a case study as a design and inquiry found in many fields especially evaluation in which the researcher develops an in-depth analysis of a case. The study used a qualitative research approach to collect data through interviews with 8 lecturers and 8 students from the said South African university in Gauteng province. The purpose of the interview was to find out how load-shedding impacts the utilisation of the LMS and what mitigating factors should be put in place to sustain the use of LMSs during the ‘dark’ days of ESKOM. Creswell and Creswell (2017) agree that qualitative research is concerned with understanding participants’ views, experiences, beliefs, ideals, thoughts, and actions of social or human problems. This benefitted the study because participants shared with the researcher their experiences as far as the impact of load-shedding on the digital technology gains in their university. The choice of the said university was because digital tools were integrated during COVID-19 where the LMS was used as an online teaching and learning tool. An interpretive paradigm was used because the interpretive paradigm is the key construct of social reality to understand the subjective world of human experience and interpret the participants’ thinking or the meaning of the context (Kivunja and Kuyini, 2017). The participants were purposively sampled to take part in the study. Green and Thorogood (2018), have defined purposive sampling as a process of selecting areas to be part of a research investigation with the aim that they will provide information considered relevant to the research problem. The participants were called L1 for lecturer 1 and S1 for student 1 and there was no specific course taught or registered for which influenced the selection. Proper channels were followed in terms of getting the participants to consent to the study and issues of confidentiality and anonymity were emphasized. The interviews were conducted through MS Teams as per the majority of the participants’ requests. This showed how far the participants have gone in using digital tools by suggesting online interviews over actual physical visits. MS Teams provides the same benefits as when face-to-face interaction is done because questions can still be probed further. Themes were used as data analysis which emanated from participant responses.

Findings

Students’ interviews

The university students are mainly Generation Y because they were born during the era of technology. These are the students who understand and know concepts of the Fourth Industrial Revolution (4IR) like Artificial Intelligence (AI), the Internet of Things (IoTs), Virtual Reality (VR), etc., and as such, they are digitally inclined. Many of them have not experienced life that didn’t have electricity since the development of South Africa after the dawn of democracy. When asked what challenges load-shedding brings to their learning, two themes emerged (Disruption in innovative learning and a scare of the future of digital education). Below is the breakdown of the students’ responses:

Disruption in innovative learning

Student 1 (S1) said: “I do Technology General and Education and Training band (GET), and in our projects when we do practical, we invent stuff. When the outbreak of COVID-19 happened, we started using the institution LMS optimally where, as a group we started researching through digital tools, the making of a Tipper Truck (project given to us). Just when we were about to put the theories into practice, load-shedding became the newer problem and as such, we had to change the kind of prototype that we wanted to do because electricity and network were unstable”. To add to that, S3 said: “In our Information and Technology class, we were on the verge of designing a database which we wanted to present to the School of Education for the Teaching Practice allocation of students and staff, but we failed to see that through because of the continued load-shedding”. In addition, S4 said: “Load-shedding boxes us, we hardly can think the way we want, and it makes education stagnant and boring which is what I am not used to”. This sentiment was echoed by S7 who said: “In class, we are taught about 4IR and the gains that come with it, but ESKOM has the final say. So, this 4IR and the positives that we are told in one of our theory subjects that it aligns with the National Development Plan 2030, will not materialise in our country and we will continue to suffer with issues of unemployment and poor and irrelevant skills”.

A scare of the future of digital education

In support of the above theme, S1 said: “I am a student teacher and when we go to our annual Teaching Practice, we teach kids that know much about digitisation and 4IR. They are always on their iPads, and smartphones learning, but when we fail to be trained to adapt to such digital tools then the future for us is bleak and if we get absorbed in schools as full-time teachers, we will surely reverse the gains that digital tools have to the schools. To add to that, S 2 said: “We just need to forget as a country that we will compete with the global economies as far as digital technology is concerned. And reverting to the old ways of doing things needs us to be taken back to Grade 1 and start afresh because I for one was never taught to write on the so-called slate like what our lecturer said she went through”. S5 said: “I believe we are a failed state. If we fail to sustain what we found in 1994, then we must just forget. We struggle to keep lights on with all our resources and many universities that we have as a country, then we need to shift our focus elsewhere but not to digital education, I am sorry, but this is my opinion”. Student 8 said: “I am honestly worried about my well-being as a teacher the day I turn professional. How will I teach if I am given a class with digital tools that operate on a particular load-shedding schedule? It cannot be. We need to work on issues of fuel price and its levy so that we resort to backup generators to keep the digital tools on if we are serious about digital education, otherwise, we just must forget”.

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Students were also asked to respond to what needs to be done to strike the balance between the persistence of load-shedding and online learning and one theme emerged from their responses (Investing in the green economy). Below are how the students responded:

**Investing in the green economy**

Student 1 said: “We are not a cold country that experiences winter like those northern countries, so why do we not resort to solar energy? But do our leaders know about it? Perhaps this is a discussion for another day hey”. To add to that, S2 said: “The president did another ‘talk-show’ when he came to my area in 2021 and spoke of hydrogen emission or something like that where he said we need to rely on the green economy like solar energy, but like all other talk-shows, he came, he spoke, we listened, and he left”.

Student 5 said: “We need to go green. We have a great deal of resources in South Africa. Our university mates designed a solar car a few years back from another campus and that was supposed to have been a reason enough to show that we can go green. We need to use solar and go green”. This was echoed by S7 who said, “We need to invest in the sun. After all, it is for free right? When we plan for load-shedding in our homes we buy those bulbs that after you switch them on when we get lucky and have electricity, they remain switched on during load-shedding, that is a sign that we need to support this green economy”.

**Lecturers’ interviews**

Lecturers’ responses seem to weigh towards a fear of returning to the old ways of teaching. Their responses did not support the total discard of digital technology, but they also cried foul of the dire consequences that load-shedding brings to tertiary teaching. When they were asked about the impact that load-shedding has on university teaching, two themes came out of their responses (Wasteful expenditure on educational digital tools and delayed acquisition of skills).

**Wasteful expenditure on educational digital tools**

In support of the above theme, the lecturers had this to say: Lecturer 1 (L1) said: “I think our LMS works just fine when the lights are on because the network is faster, but coming to think of it, we were given at the beginning of lockdown to sustain the teaching, to me we wasted money. These mods need the network to operate because if you want to have an online class during load-shedding, your problems are two-fold, students struggle to connect wherever they would be and I might not have a clear connection if I experience load-shedding at that time, making my modem a useless tool. Load shedding cripples the economy of universities and livelihoods”. This was echoed by L2 who said: “Before I get into classroom issues, at home when you do groceries, you need to buy uncooked food and those that are ready in preparation of load-shedding. When you buy electricity, you also need to either buy paraffin or fill up gas and this is a double wasteful expenditure, the same as when you go to class, you prepare slides and print them out just in case something trips in some power station”. Lecturer 5 said: “I just logged a call with the technical department to ensure that my classroom digital tools work optimally, and that was fixed but the number in which I used these tools versus those that I read from the book are many, we have resources that are wasted because of electricity issues”.

**Delayed acquisition of skills**

“I teach Information Technology II, and this is a very practical module, during load-shedding, there is nothing to do with these students because my subject needs a computer. This is worsened by the fact that my campus does not have a backup generator, so when my class starts around midday or later and load-shedding happens, we all go home” (L2). On the other hand, L3 said: “We now teach for marks and not for skill acquisition because you can plan after checking the load-shedding schedule for our area here on the campus, but there is what they call planned maintenance and breakdown of units there at Eskom, which makes us to completely stop in what we planned and as such, we fail to upskill the students”. This was supported by L7 who said: “We only plan to submit marks on time and sadly, students enjoy it because when there is load-shedding, they go back to where they come from. As such, we have challenges in imparting skills in this Fitting and turning course”. This was added by L8 who said: “I teach Automotive repair and maintenance, I never taught wheel balancing the way I should because of load-shedding. Now we are in June and the students are still in recess and when they return, we need to finalise marks with less teaching time because load-shedding makes those demands on us”.

On the question of how the university can bridge the gap between the effects of load-shedding and teaching and learning, two themes also emerged: Investing in an uninterruptible power supply (UPS) and stakeholder involvement. Below are the responses that lecturers gave to the two themes:

**Uninterruptible power supply**

In support of the above theme, all lecturers lamented the issue of leaving during load-shedding, they all supported the acquisition of the Uninterruptible power supply (UPS). For example, L1 said: “I know of a sister university in this province where the administrators have desktops that have the UPS, and during load-shedding, you cannot even realise that power is gone. This was echoed by L3 who said: “We need to have backup generators that will kick in every time we have load-shedding”. This was supported by L4: “We should buy the Uninterruptible power supply be it the devices or have solar as a backup, this will ensure that we teach as planned and skills are imparted as needed”.

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Stakeholder involvement

Lecturer 1 said, in support of the above theme: “Where are the university stakeholders if the situation is like this? Don’t we have funders who can assist us in making sure that teaching and learning continue?”. To add to that, L3 said: “I doubt that our institution has stakeholders like business moguls because if we had some, they would have come in handy to assist the institution”. To add to that, L4 said: “I sense a gap in terms of stakeholder involvement with universities because if some stakeholders can assist ESKOM, surely those that are for universities should, unless our university does not have any”. This was supported by L6 who said: “It is high time the university business comes on board to rescue the situation because there is no way that the industry-based programme that we use to place our students are not having close-ties with us. If they don’t, then they too run the risk of receiving students that would be a burden in their firms during the industry-based Work-integrated Learning”.

Conclusions

There is no doubt that load-shedding has more vigor on how South African universities should operate and as such, it has the forte to reverse the gains that digital technology brings into the classrooms, as alluded to by the participants. The South African universities that do not have backup generators operate on ESKOM’s demands. If the lights are off, all its online activities come to a halt, thus making even the digital tools that were sought during the outbreak of COVID-19 unworthy. Students raised important issues about how their learning is affected during load-shedding. The fact that S1 said that making a project in his Technology GET class during load-shedding affects his level of innovation, is worrying. This is echoed by Jung and Huh, (2019); Kuosa, et al., (2016), and Watson and Watson (2012), that an LMS or a digital tool has multiple online operations and behaves as a framework to capture numerous layers of progressive learning, which during load-shedding all becomes impossible. To add to that, the sentiment by S2 that we need to forget as a country that we will compete with the global economies in terms of 21st-century skills development is attested by Park and Jo (2017) in their definition of the complexity theory that organisations are made up of interconnected and well-structured parts and the decision or action of one component affects the other. This is so because the challenges at ESKOM, have dire consequences in the South African universities in how far they can go in terms of being global competitors. This is true because a decision that is made in one component within the ESKOM ‘organisation’ affects the whole system, the university included (Lai and Huili Lin, 2017), Rosenhead, et al., (2019).

The latter statement was lamented by lecturers where L1 raised his concerns on the role of stakeholders in assisting South African universities to deal with issues of load-shedding. Mabunda et al., (2023) claim that small businesses operate within internal systems consisting of input, transformation, and output. This is like the South African universities which have stakeholders who need to support the academic activities. However, as it stands, there seems to be a lack of stakeholder involvement in many South African universities, particularly the one where this study was conducted. On the other hand, the students called for the use of renewable or solar energy because it is cheap. Student 5 called for the country to go green since the source is the sun and is technically free so that online teaching and learning keep going. His sentiments make sense in that the expenditure that ESKOM incurred was R338 billion when compounding the effects of load-shedding dating back from 2007 to 2022 (Erero, 2023). The lecturers on the other hand saw the acquisitions of modsens that the institution gave them at the beginning of the outbreak of COVID-19 as wasteful. Lecturer 1 said his modem works fine when there is electricity because the network becomes faster. Despite countries having recovered from the COVID-19 pandemic, there continue to be inflationary pressures, which in universities, affect digital technologies and integration (Kpodar and Liu, 2021), like devices that were sought, to work when there is electricity only. In Australia, like in many other well-resourced countries, the use of the Internet to support remote learning was already in place by the outbreak of COVID-19 (Maher, 2021) which is not the case in South Africa’s universities. An LMS supports an inclusive learning environment for academic progress with interceding structures that promote online collaborative groupings, professional training, discussions, and communication among other LMS users (Bradley, 2021). However, such inclusive learning environments are none in an environment where impeding factors like load-shedding persist. This study proved that as a country we are aiming to achieve our National Development Plan in 2030, and the persistence of load-shedding continues to have a say on that achievement.

Based on the findings that emerged from the participants, there is a need for South African universities to invest in sustainable energy that would keep online teaching and learning activities ongoing. The issue of digital technologies cannot be ignored, particularly with the flight that the country is headed in meeting the 4IR agenda. The call by the participants is that lights need to be kept on in their universities. The call for an Uninterruptible power supply (UPS) by lecturers needs to be adhered to. Students called for renewable energy which they believe would come in handy to keep the lights on so that their innovative skills would be kept afloat when they make projects or research. The complexity theory states further that a decision made in one component affects the whole system (Lai and Huili Lin, 2017), Rosenhead, et al., (2019). This study agrees with the theory by pointing out that the components that make up ESKOM, should work together so that they are all pulling together in making sure that the lights are kept on because if one component pulls in the opposite direction, ESKOM becomes unstable, and load-shedding will remain (Mabunda et al., 2023).

The study is limited in that it focused on a selected South African university and it was conducted as a qualitative study. The author believes that had the population been larger, more depth to the findings would have been great.
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