The impact of load shedding on information organisation education in South Africa

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A well-educated and highly skilled information organisation workforce is essential in the current information environment. In South Africa, Library and Information Science (LIS) schools are entrusted with producing graduates with capabilities to organise information and make it accessible and retrievable. Load shedding hinders the provision of effective education to information organisation students in South Africa. This study uses and interpretivist paradigm and follows a qualitative research approach to elucidate the impact of load shedding on information organisation education in South Africa. Semi-structured and focus group interviews were employed to collect data from seven out of eight LIS schools that offer information organisation in South Africa. Purposive sampling was used to select information organisation academics and students as participants. Load shedding was found to have a negative impact on information organisation education in South Africa. It hinders access to information organisation tools, causes the loss of teaching and learning time, results in students' failure to submit assessments timeously, and yields psychological effects. The participants checked the load shedding schedule and used Uninterruptible Power Supply and rooftop solar photovoltaic systems as coping mechanisms. The study recommends the provision of portable power banks to students, investment in green energy by universities and subsidising households to install rooftop solar photovoltaic systems. Although limited to the LIS schools that participated, this study provides insights and strategies to strengthen information organisation education in crises such as load shedding.

Keywords: Education; Electricity; Eskom; Information organisation; Library and Information Science; LIS, Load shedding; South Africa.

1. Introduction

Education for information organisation features in various academic and practice literature. Information organisation resides within the Library and Information Science (LIS) academic discipline as well as library and information services. According to Tumuhairwe (2013), LIS refers to the scientific and technical foundations of librarianship and its relationship with information science. As such, LIS is the integration of library science and information science (Tumuhairwe 2013). Information organisation plays a crucial role in ensuring that information sources are easily organised, traceable and retrievable. Against this background, LIS schools in South Africa depend on electricity supply as one major utility mainly provided by Eskom, South Africa's state-owned electricity public utility. The implementation of emergency remote learning during the COVID-19 pandemic made electricity a prerequisite for information organisation education, as teaching and learning tools depended on it. For instance, remote and online learning requires Information and Communication Technologies (ICTs) equipment such as laptops, computers, and smartphones. Learning Management Systems which serve as online campuses for remote and online students as well as information organisation tools, such as *Web Dewey, Resource Description and Access (RDA) Toolkit* and electronic versions of subject headings, *Anglo American Cataloguing Rules, second edition (AACR2)* and *Dewey Decimal Classification, 23rd edition (DDC23)*, require proper network and reliable electricity supply. However, South Africa's major supplier of electricity, Eskom, has been grappling with the mismatch between supply and demand for power since 2007, prompting it to impose load shedding on electricity consumers. Load shedding, also known as power outages, refers to the intentional switching-off of electricity supply to certain areas to avoid widespread blackouts and total collapse of the grid (Wood 2023).

In South Africa, load shedding is divided into stages based on the extent of the shortage of generation capacity to meet the demand, with stage 1 being the least serious, and stage 8 being the most serious. Stages 1-4 lead to 2-to 4-hour power outages. Stages 5-8 may result in up to 6 hours of no electricity. Load shedding worsened between 2019 and 2023 when South Africa started experiencing a higher stage (stage 6) for the first time (Schoeman & Saunders 2018). This higher stage of load shedding posed a serious threat to the sustainability and quality of the curriculum and teaching across the country due to the dependence on electricity for hardware and educational resources (Matsheta & Sefoka 2023). For example,

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online classes rely on video conferencing platforms, multimedia presentations, and digital resources, all of which require electricity and technological infrastructure (Yende & Madolo 2023). In April 2024, the National Energy Regulator of South Africa (NERSA) approved guidelines for a new stage framework which introduced stage 16 of load shedding which could result in 20 hours of power cuts in a day. This signalled a possible intensification of load shedding in South Africa although load shedding has been suspended since March 2024 (Staff Reporter 2026). Despite the suspension, the Minister of Electricity has consistently confirmed that load shedding is not yet over in South Africa (Pillay 2025), giving rise to the necessity of this study focusing on the impact of load shedding on the education for information organisation.

The impact of load shedding in higher education has been researched in various academic fields. Yende and Madolo (2023) pointed out that music students have limited access to instruments and practice spaces and are therefore unable to hone their musical skills. Yende (2024) further found that load shedding exacerbated inequalities in education, as it limits students' ability to access and use electronic resources and online platforms, which often provide more affordable alternatives. Information organisation education also relies on electricity, however, the impact of load shedding on education remains an under-researched area.

2. Problem and purpose of the study

Despite the importance of information organisation and the efforts of LIS schools to contribute towards a knowledgeable information organisation workforce, load shedding hinders South Africa's efforts to expand its educational system due to its unpredictability regarding its duration and timing. This leaves students uncertain of to access essential virtual classes or participating in any necessary e-learning activities outside class (Kgarose, Makhubela & Setaise 2023; Queiros & Villiers 2016). The adoption of remote learning during COVID-19 made electricity the engine of information organisation education. For instance, educational devices and online information organisation tools require a constant flow of electricity to function.

However, there is less knowledge on how load shedding affects the education for information organisation in South Africa as well as academics and students' coping strategies. Knowledge of the impact is crucial to ensure that quality information organisation is provided by mitigating the challenges brought by load shedding. If the challenges are not alleviated, load shedding might present adverse effects on the information organisation education and therefore undermine the efforts of LIS schools to produce quality information organisers. Hence, it is important to investigate the impact of load shedding on the education for information organisation in the LIS schools in South Africa. The objectives of this study are:

- To analyse the challenges caused by load shedding on the education for information organisation.
- To determine the coping strategies employed to reduce the impact of load shedding on the education for information organisation.

3. Literature review

This literature review is divided into three sections, covering load shedding in South Africa and the impact of load shedding on various sectors and education.

3.1 Load shedding in South Africa

Although load shedding in South Africa started in 2008, energy challenges were foreseen four years into the new democratic government leading to the White Paper published in 1998. However, Eskom was not granted permission to build new power stations (Kenny, Cronje, Jeffrey, Moloi, Dilmant, Kane-Berman, Matsokotere & Zwane 2015). Eskom has attributed load shedding to insufficient generation capacity (Inglesi-Lotz 2023). Poor leadership and management are also linked to the energy crisis in South Africa. It is claimed that the democratic government only planned to build new power stations in 2004, connoting poor leadership and lack of foresight. Lack of maintenance of power stations due to financial constraints also contributed to the problem (Kock & Govender 2021).

Bad weather and wet and poor-quality coal also caused plant damage (Matona 2014). The use of poor-quality coal contributed to the breakdown of power plants, despite Makgetla and Patel (2021) alluding that South Africa is one of the largest coal producers in the world. Marchetti-Mercer (2023) attributed load shedding to systemic socio-political factors, ensuing from political instability, corruption and inadequate investment in infrastructure. Similarly, Timse (2022) points out that the core of Eskom's operational difficulties is a complex crime syndicate comprising corrupt officials, police, and trucking companies. In relation to this, Eskom (2023) cites acts of theft, vandalism, and sabotage as the root causes of persistent load shedding. Other root causes of load shedding relate to electricity theft by using illegal vouchers, illegal connections, tampering with meter boxes, cable theft and tariff cross-subsidisation (Ateba, Prinsloo & Gawlik 2019). Madumi (2024) observes that these problems not only lead to revenue losses for Eskom but also put further pressure on an already fragile electricity grid, making it difficult to maintain a stable and reliable power supply.

3.2 Impact of load shedding in various sectors

Load shedding affects the social, economic and environmental aspects of society. A study by Masibi (2015) found that load shedding resulted in financial loses of ICT based enterprises, as entrepreneurs spent a lot of money on alternative power sources, payments of overtime to employees and replacement of broken devices. In the agricultural sector, load shedding leads to decreased production due to the interruption of workdays (Cloete, Pienaar & Van der Merwe 2023). The delays and decreased productivity also lead to job losses and destruction of the livelihoods. Additionally, low productivity results in higher selling prices of agricultural products (Cloete, Pienaar & Van der Merwe 2023).

A study by Tembe (2023) revealed that load shedding negatively affected the staff and guest morale of the accommodation services in Pietermaritzburg, South Africa. During load shedding, staff members had to resort to a labour-intensive manual work while others clocked-in late due to traffic congestion. In addition, guests expressed dissatisfaction with the inadequate service, which they blamed to malfunctioning escalators, noisy generators, a weak network that made it difficult for guests to stay connected, and unavailability of cooling devices (Tembe 2023). Load shedding is also associated with losses on small and medium-sized enterprises' production and resulted in the companies laying off their employees because they were unable to pay their wages (Mabunda, Mukonza & Mudzanani 2023). Despite the negative impact, load shedding has offered entrepreneurs new business opportunities due to government investment in renewable energy exploitation.

Load shedding led to the disruptions of essential services such as the South African Police Services (Pollet, Staffell & Adamson 2015) and healthcare facilities. The blackouts also led to increased tax evasion by businesses (Kamasa, Adu, Oteng-Abayie 2019) and the non-payment of utility bills by households (Dzansi, Puller, Street & Yebuah-Dwamena 2018). In households, Masinga and Madzivhandila (2023) found that load shedding led to food spoilage due to malfunctional refrigerators leading to further economic hardship. In library and information services, load shedding causes closure or limit access to libraries and library services such as Open Access and library websites (Bangani 2024). In addition, Arshad and Shafique (2014) found that load shedding affected access and use of online public access catalogues. Load shedding's effects on academic libraries include interference with online information literacy training, delay in the delivery of books through resource-sharing, as well as limiting participation in empowerment workshops and conferences (Bangani 2024).

3.3 Impact of load shedding on education

Education and training experiences untenable effects of load shedding. Matsheta and Sefoka (2023) highlight the severity of load-shedding as a significant threat to students' access to education in the country. The adoption of the emergency remote learning during the COVID-19 lockdown forced academic institutions in South Africa to offer online classes only. The transition from face-to-face and blended approach to emergency remote education required access to technology, having a stable learning environment, and technological skills to partake in learning activities. Majola and Mudau (2023) found that load shedding was one of the challenges faced by Open Distance e-Learning (ODeL) students during the administration of online examinations. Mlambo (2023) found that load shedding caused network challenges that made it difficult for teachers and learners to access WhatsApp, which was used as an educational tool.

Mthanti (2023) revealed that load shedding contributed to the discontinuation of e-learning programmes, low throughput rate and increased rate of student dropouts in South Africa. In Pakistan, Malik, Memon, Ali, Mallah, Bux and Haq (2022) found that most of the university students' punctuality to classes, assignment submissions, self-study and results were negatively affected by load shedding. Additionally, load shedding affects water supply, making it difficult for students to uphold personal hygiene (Marchetti-Mercer 2023).

4. Methodology

This exploratory study employed a qualitative research approach located within the interpretivist paradigm. Eight out of nine targeted universities granted the gatekeeper permissions and thus allowed the study to be conducted in eight LIS schools. These universities were targeted because they offered information organisation as part of their LIS qualifications. Fifteen academics from eight LIS schools offering information organisation were purposefully selected for their knowledge, authority, and expertise relevant to the problem under investigation. Information organisation academics deal with information organisation as a core component of their daily teaching and scholarly activities, which provides them with both theoretical knowledge and practical insight, positioning them to offer informed and relevant perspectives to research questions. LIS students were also selected purposefully for their knowledge of the education and training for information organisation. Data were collected using semi-structured interviews and focus groups. Semi-structured interviews enabled the researcher to modify the arrangement of the questions and to tailor subsequent questions based on the participants' responses. To collect data from the focus groups, the researcher requested academics to link him with the students who

were interested in participating in focus groups. Twenty students from three LIS schools participated in four focus groups. The focus groups comprised three undergraduate and one postgraduate diploma groups. Semi-structured and focus groups interviews were conducted remotely using Microsoft (MS) Teams in 2023.

Data were analysed thematically following the six steps recommended by Braun and Clarke (2006) namely, familiarising oneself with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Thematic analysis aligns with the exploratory research design because the codes were not predetermined and were data-derived from primary sources of data collected through interviews and focus groups. To ensure anonymity, academic participants were given aliases such as Participant A1, A2, etc., while students were named Participant S1, S2, etc. To establish the rigour of the study, the triangulation and pretesting of data collection instruments were conducted. Semi-structured and focus group interviews enhanced the credibility of the study. A pretest study with a small group of LIS academics enhanced the dependability of the data collection instruments because the experts were able to identify some ambiguities, confirm feasibility, practicality of the study, including the time required to complete the interview.

5. Findings

In this study, load shedding emerged as a challenge that affected information organisation education, as teaching and learning could not happen due to devices running out of batteries and network disruptions. Additionally, the coping strategies to address these challenges were specified by quoting the interviews verbatim. According to Corden and Sainsbury (2006), quotations provide concrete textual evidence and help to support the reader's evaluation of the accuracy of the analysis, which builds credibility and strong findings. In line with Noble and Smith (2015:35), this study includes "rich and thick verbatim descriptions of participants' accounts to support findings".

5.1 Challenges caused by load shedding on the education for information organisation

The findings indicate several challenges related to teaching and learning for both academics and students. The challenges are mainly caused by internet connection problems and empty device batteries during load shedding. It emerged that the internet signals are severely distorted during load shedding that the speed nearly drops to 0 bytes. In some areas, it becomes impossible to make a normal voice call.

5.1.1 No access to information organisation tools

Information organisation tools as instructional materials are a prerequisite for effective curricula delivery. However, participants indicated that they did not have access to information organisation tools for teaching and learning during load shedding. The impact of load shedding on these tools was indicated by Participant A1:

> *"Now, you see we have got load shedding, and it leads to low bandwidth, and you cannot access the RDA toolkit. Once you do not have Eskom [electricity], the access to RDA toolkit is compromised. So, you have no choice but to cancel the class."*

Participant S4 shared similar sentiments:

> *"Some of us use Web Dewey because we do not have hard copies of DDC23, and it needs a strong bandwidth. During load shedding, it becomes difficult to access Web Dewey because network is slow."*

Participant S14 alluded:

> *"Both DDC23 and AACR2 are available in PDF format and access to them is limited to my laptop's battery which dies few minutes after load shedding."*

The availability of information organisation tools positively affects the education and training of library and information services professionals and their knowledge acquisition. This implies that no proper teaching and learning can take place during load shedding.

5.1.2 Loss of teaching and learning time

Load shedding led to the loss of teaching and learning time, as classes had to be postponed, which further affected the class timetable, especially in contact LIS schools. Participant A3 echoed:

"When we are affected by load shedding, I cancel the class. Sometimes, we cannot even cover the learning units or the syllabus extensively because of cancelled classes".

Participant A8 also commented thus:

"The main challenge that I see with our students is emanating from load shedding because students are unable to attend online classes".

While Participant S9, who was using an old laptop, could not do any academic activity during load shedding as the laptop battery died, Participant S18 commented that:

"I have been affected by load shedding because there were days when we were scheduled to have a class online, I could not attend."

In addition to load shedding, some participants experienced load reduction, which was mainly implemented in rural and semi-urban areas. The difference between load shedding and reduction is that the former is implemented across the nation when there is not enough capacity to generate electricity whereas the latter happens during peak hours to densely populated areas, which overloads the grid. Participant S4 had this to say in relation to load reduction:

"Load shedding is better; load reduction affects us as people who are in the rurals where we are hit with four hours blackouts from 05:00 to 09:00 and 17:00 to 21:00".

A report by Maggott, Mbatha, Ceruti, Moyo, Mporo, Ngwane, Shezi and Sinwell (2022:67) regards load reduction as "a discriminatory form of energy saving that reinvents and revives racial discrimination and class disadvantage". The geographic implementation of load reduction resonates with the assertions by Inglesi-Lotz (2023) who postulates that low-income households prone to more frequent breakdowns take more time to be resolved because of ageing and less-reliable infrastructure. In contrast, Mabunda, Mukonza and Mudzanani (2023) demonstrate that load shedding was experienced uniformly by everyone regardless of the demographics.

5.1.3 Failure to submit assessments

Connectivity problems lead to students missing submission deadlines for online assignments and examinations. Participant A8 said:

"Students are unable turn in their assignments and worse part, they fail to submit their examination scripts. This one of examinations is very sad because we have students who repeat modules just because they could not submit due to load shedding".

Participant A12 from the CODeL institution shared the story thus:

"There are many students who experience network challenges leading to them failing to download the question papers and submit their answer files. Unfortunately, some cannot even contact the university because they don't have network".

Participant S12 responded thus in the focus group:

"Can you imagine the pain of writing an examination, then when you are about to submit, boom! load shedding hits and network goes away? You then fail to submit the examination. It is painful and traumatic"!

The above scenarios suggest that the participants viewed load shedding as a contributing factor towards the failure rate in information organisation. Load shedding therefore affects the provision of quality education and poses hindrances to attaining academic achievement (Mashiyane, Masuku & Maphumulo 2024). Suffice to say, information organisation students are not expected to perform to their utmost capabilities due to the load shedding.

5.1.4 Effect on work-integrated learning

In addition to the loss of teaching and learning, load shedding affected practical skill acquisitions during the work-integrated learning (WIL). Students could not complete their WIL successfully due the interruption of attendance during load shedding.

Some LIS students reported that they could not perform information organisation tasks during load shedding. For instance, Participant S3 reported:

> *"We could not catalogue during load shedding because the library did not have backup system".*

Participant S4 supported:

> *"We were in the cataloguing section for a week but there are two days we didn't do much because there was load shedding, so they just told us to do shelf-reading".*

Participant S5 added as thus:

> *"The library I was doing the practical with closed during load shedding. Sometimes, we only spent two hours in the library, and you cannot learn anything in two hours".*

Participant S6 commented:

> *"The day I was supposed to visit the cataloguing section, I was late because of traffic caused by load shedding. Load shedding was implemented in the library after 2 hours of my arrival then we closed the library."*

Bangani (2024) showed that some libraries were closed during load shedding. This means that some students who were due for information organisation WIL could not acquire the necessary skill.

5.2 Coping strategies during load shedding

Having identified the impact of load shedding on the education for information organisation, it became relevant to determine the coping strategies of information organisation academics and students during load shedding.

5.2.1 Checking the load shedding schedule and planning ahead

All the participants indicated that they kept abreast with load shedding schedules to effectively plan their days and maximise productivity when power was available. Some academics indicated that they recorded classes if load shedding was to be implemented during class time.

Participant A4 said:

> *"I just record what I was going to teach and set the recording to be available during class time. Then pose a question that students will discuss in the forum".*

Some academics indicated that they conducted classes from their offices since their offices were generator-powered. For example, Participant A3 posited:

> *"Once I know that I am scheduled for load shedding during my class time, I simply go to the office and facilitate my class from there".*

Some students indicated that they watched class recordings when they could not participate during load shedding. Participant S4 underscored:

> *"If you missed class, you have no choice but to watch the class recording as soon as possible".*

The above scenarios imply that students who missed classes may also have missed out on the important class discussions, especially considering that Participant A4 announced forum discussions in a recorded lecture.

5.2.2 Use of Uninterruptible Power Supply and rooftop solar photovoltaic systems

Some academics used Uninterruptible Power Supply (UPS) and installed rooftop solar photovoltaic (PV) systems in their households. Participant A4 postulated:

> *"I had no choice but to buy UPS. Since we purchased the UPS, things have become easier because I am able to work even during load shedding for as long as I still have a battery".*

It emerged that students relied on power banks to recharge their devices and rechargeable lights to provide lighting for study purposes. Participant S2 commented:

"We have these rechargeable battery lights at home, so at least I can study manually using physical books during load shedding".

Participant S10 added:

"I bought a power bank to charge my smartphone, but it only helps when I work offline because there is no network connection during load shedding"

5.2.3 Use of candles for lighting

The use of candles was mentioned by CODeL student participants. These students studied while staying at home. Participant S8 mentioned:

"We use candles just so that one can study".

Participant S10 added:

"We also use candles at home. If you once lived in the rural areas, you would understand that it easy to get candles than paraffin or solar panels".

6. Discussions

The impact of load shedding on information organisation education in South African LIS schools extends to the very heart of the educational experience, affecting students, academics and educational systems. The findings revealed that load shedding widened the digital divide, which affected all aspects of remote learning, including class attendance, accessing online information organisation tools such as *RDA* and *Web Dewey*, engaging with synchronised learning, and submitting assessments. All these issues may affect academic performance. Similar findings emerged in music education where students could not use electronic resources (Yende & Madolo 2023). Failure to integrate online information organisation tools may not only have an impact on students' direct learning experiences but also affect their ability to compete in the digitally driven library and information services environment.

Consistency is important in LIS education (LISE), especially in information organisation, where continuous hands-on practice is required. However, load shedding introduces a stop-start nature to learning, making it challenging for students to learn at a consistent pace (Yende 2024). This inconsistency hinders students' ability to build upon previously acquired knowledge and skills, leading to frustration and a sense of stagnation. Similarly, load shedding affected academics' capacity to develop and implement long-term educational plans (Mhlanga & Moloi 2020). The overall quality of LISE provided in South African LIS schools may suffer from this inconsistent planning. LIS students' experiences of load shedding varied across neighbourhoods in South Africa. Students in rural and informal settlements experienced more power outages than those in urban and semi-urban areas (Aidoo & Briggs 2019; Nduhuura, Garschagen & Zerga 2020; Maggott et al. 2022). Load reduction was also implemented in rural and informal settlements than in urban and semi-urban areas. Maggott et al. (2022) also observed the prevalence of load reduction in rural than urban areas.

To address these challenges, various coping strategies were employed such as checking load shedding schedules and investing in alternative energy and back up sources. However, the use of UPS and power banks only helped in powering the participants' devices but not with the network. Some students relied on candles for lighting, as affirmed by Masinga and Madzivhandila (2023). Hurst and Donian (2024) showed how South Africans relied on humour about load shedding through social media platforms. Although all types of power disruptions are planned and pre-determined, it is a norm for any load shedding stage to be implemented with immediate effect. This means that academic plans would still be affected even if academics and students followed the planned and pre-determined schedule.

7. Conclusions and recommendations

This qualitative multiple-case study investigated the impact of load shedding on information organisation education in South Africa. The findings from the data collected from eight LIS schools offering information organisation revealed that load shedding affected information organisation education in various aspects, leading to the failure in accessing information organisation tools, submission of assessments and attending lectures. This has had serious consequences, as it deterred skill development, performance, and overall information organisation proficiency. This, in turn, jeopardised students' preparedness for the world of work. However, this study proffers that LIS schools can play an important role in providing information organisation education during load shedding through synchronous and asynchronous learning, which guarantees equal and fair access to digital and cutting-edge learning resources. Asynchronous learning means that students will access study material when they are not load shed.

Even though diesel generators are installed in most South African universities (Booysen, van der Berg & van der Walt 2023), remote students do not benefit much from this. Thus, households are required to install battery-backup solutions relying on solar and UPS. This study recommends the provision of portable power banks as part of the digital learning resources by LIS schools. To reduce the impact of load shedding where stages are changed without prior announcement, students and academics are encouraged to align their academic activities with load shedding schedules in all the stages to guard against the transition made at short notice on the day. LIS schools can create catch-up assessments to accommodate students who fail to submit their assessments. To deal with load shedding, some participants recommended the return of face-to-face operations, as universities have backup generators and rooftop solar PV systems. This recommendation was implemented in some LIS schools during the write-up of this study. However, returning to class physically increased universities' expenditure on fuel for generators to mitigate the impact of load shedding on classes and student learning (Businesstech 2023). Thus, an investment in green energy by universities is further recommended.

This study has practical implications to the education of information organisation and the entire LISE, which should occur without any disruption. Among others, the study could raise awareness about the implication of load shedding on the education and training for information organisation in particular and LIS in general. Awareness and knowledge about this challenge will put LIS schools in a better position to offer an uninterrupted education and training of information organisation students amidst load shedding by adopting flexible teaching approaches. Load shedding stages can change without prior notice, which means that areas which were not due to be load shed in a particular stage could still be load shed when a new stage is implemented. To avoid the cancellation of classes, academics must practice the flipped classroom teaching strategy by recording their lessons and use the class time for discussions and questions. In this way, students who miss classes can use alternative channels to ask questions. A load shedding advocacy is also recommended to sensitise LIS schools about the challenge and the need for urgent action. This can be achieved through social media campaigns, seminars and e-mail notices.

It is recommended that the government encourage and subsidise households to install rooftop solar PV systems and create policies that guide communities to build their own solar power stations. Noteworthy, the South African government initiated a subsidy for this, but it only lasted for a year. A limitation of this study is that data was collected in a single time; a longitudinal study could provide insights into how load shedding's effects change over time and its impact on academic performance. In addition, the findings are limited to information organisation modules and do not cover other modules offered in LIS qualifications. Load shedding and its impact on LISE affect university policies. This study could inform policy design and implementation about the need for sustainable energy solutions in academic institutions.

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