Using MyLSU app to enhance student engagement and promote a smart town at a rural university in Zimbabwe

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Abstract: This paper discusses the evaluation of an app that was developed to enhance student engagement, thereby transforming a rural university into a smart town. This account provides an opportunity to strengthen the deployment of smart services and digital technologies that enhance student engagement. Developed countries have integrated virtual and physical systems to support education and industrial processes while developing countries such as Zimbabwe seem to be lagging. Government and funding organisations for higher education institutions have expressed interest in clear strategies that encompass student engagement in their policies and activities. The study focused on developing an app that enhanced student engagement aspects related to off-the classroom activities such as voting for leaders, sports and social activities. The study employed design science research methodology, a paradigm used for the development of artefacts that are aimed at solving real-world problems. A user-centred design methodology was adopted to guide the app development process as it enhances user acceptance. A total of 220 participants successfully evaluated the app through a questionnaire. The results of the evaluation revealed that the app was usable, easy to learn, and they would...

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Vusumuzi Maphosa holds a doctoral degree in Information Systems and Technology. He has extensive experience in leading knowledge management and ICT based interventions in public, private and voluntary based organisations. His research interests are on transformative concepts and technologies that include Educational technology, ICT4D, Industry 4.0, data mining, IoT and smarties, semantic webs and ontologies and e-governance. He has published and presented papers at national and international conferences. This research is part of a wider ICT4D project.

PUBLIC INTEREST STATEMENT
Developed countries have integrated virtual and physical systems to support education and industrial processes while developing countries such as Zimbabwe seem to be lagging. Design science research methodology and user-centred design approach were used to guide the app development process. The study focuses on the development of a mobile app for enhancing student engagement. The app promotes concepts of a smart university town through off-campus activities such as voting for student leaders and information on events and social activities. A total of 220 participants successfully evaluated the app. The results of the evaluation reveal that the app was usable, easy to learn, and participants would recommend it to others. These results will help policymakers and educators to refine the app features and content to enhance student engagement. Recommendations proffered can help researchers to explore how mobile apps can be used to promote smart-university towns.
recommend it to others and agreed that they could use the app with no assistance. The results show that the app promoted student engagement and promoted concepts of a smart town. These results will help policymakers and educators to refine the app features and content to improve student engagement. Recommendations proffered can help researchers to explore how mobile apps can be used to promote smart-university towns.

**Subjects:** Management of IT; Computer Science (General); Information & Communication Technology (ICT)

**Keywords:** Design science research methodology; technology acceptance model; user-centred design; mobile apps; Connectivism; Digital natives; student-based activities

1. Introduction

Universities have long been known as “innovation launch pads” due to their experimental nature and as many such universities have mirrored smart towns by integrating various Internet of Things (IoT) devices. Yigitcanlar and Sarimin (2011) concluded that universities were vital in building smart towns and knowledge cities as they develop human capital. Lupane State University (LSU) is located in Zimbabwe’s Matabeleland North province. The university is one of the few viable economic institutions in Lupane district, providing the most massive infrastructure and contributing almost 50% of Lupane town’s population. The establishment of the university has brought an increase in economic activities through the influx of both students and staff populations who spend their income in promoting local businesses/service providers as well as revenue contribution to the town through the payment of rates and purchase of residential and commercial stands. In developed countries, higher education institutions have long embraced IoT and adopted technologies such as mobile applications (apps) that enhance access to information related to class timetables, campus tours, course registrations and access learning systems (Smith et al. 2011; Harvard Mobile, 2017). The compactness, mobility, and low cost of mobile devices provide more convenience and offering seamless access to education, thereby promoting off-campus learning. Most universities have acknowledged the role of student engagement in improving students' learning experience, and have set up policies and practices to foster engagement (Baron & Corbin, 2012). Some researchers have examined several aspects relating to student engagement, such as emotional and behavioural aspects, psychological and social engagement, together with campus and class engagement (Hausmann et al., 2007; Matthews et al., 2011).

The mobile phone has become an indispensable tool for all, providing a platform for even the poor to engage and participate in economic, financial, health, and educational activities. Mobile phone penetration continues to grow in Africa, and in most instances, the mobile phone remains the only device that enables individuals to access the internet (GSMA, 2018). Increased mobile phone use resulted in Zimbabwe’s internet access increasing from about 7% in 2000 to over 50% in 2016 (Lancaster, 2016). This technology can help students get their work done, stay on track, and stay connected to their campus. Kuh et al. (2010) highlighted the impact of student engagement on academic success and reiterated that mobile phone apps presented immense opportunities to engage students in and out of the classroom. Most universities in developed countries offer information portals that allow students to access content that improves the student’s experience. Students are, therefore, always connected to their university and are not likely to miss important events, thereby building more robust social networks through enhanced student engagement, making the learning experience more enjoyable.

There has been a gradual shift in the way students access information, as they prefer to access information on the go, anywhere and anytime (Martin et al., 2013). Today’s students have been labelled as the “digital natives” or “net generation” as they were born encompassed by digital technologies and readily embraced new technologies (Prensky, 2010). One study showed that
Digital natives had higher ICT skills in their courses than digital immigrants (Suša, 2014). Digital immigrants are students that were born before 1980, while the “net” or “Google generation” are those born after 1993. The “Google generation” refers to the group that grows up immersed in internet-mediated devices. Stokburger-Sauer and Plank (2014) acknowledged the crucial dimensions of digital natives as being highly skilled in using mobile and digital media.

Mobile technologies have ushered a new educational paradigm through affordances created by digital media (Cope & Kalantzis, 2008). As a result, learning management systems have been developed to transform old pedagogical practices into new student-centred systems that are adaptive. Technology has brought new affordances, allowing teachers and learners to do more things and doing them more comfortable than before (Cope & Kalantzis, 2008). Several theories and approaches relate to mobile learning, such as situated learning, context awareness, conversational learning, connectivism, navigationist and location-based learning (Keskin & Metcalf, 2011). The navigationist theory states that learners should identify, and evaluate various sources of information and apply the resultant knowledge to their life to solve problems and share the acquired knowledge with others (Brown, 2004). The connectivism model asserts that learning is a process of connecting to disparate information sources since learning is no longer an individualistic activity (Siemens, 2004). Location-based learning ensures that location-specific content is delivered to the student to aid contextual learning (Johnson et al., 2009). Ubiquitous learning technologies have created new research opportunities for scholars to evaluate how these affordances can be used to develop adaptive learning environments that improve student engagement.

The commonwealth policy on higher education funding requires evidence from institutions, showing simple steps and attempts to enhance student engagement (Leach, 2016). To take advantage of the opportunities offered by mobile devices to support learning, LSU adopted the Bring Your Own Device (BYOD) policy, premised on a dwindling information and communications technology (ICT) budget. This study focuses on the development of a mobile app in a university-based in a rural community to enhance student engagement through access to services that improve campus experience, foster a sense of belonging which may improve learning outcomes. Adopting digital technologies may ultimately result in the creation of a smart university town in a rural context, ensuring that the student’s campus experience is improved.

2. Smart town concept
A “smart town”, improves efficiency in managing resources, promotes environmental sustainability and citizen engagement through the application of broad-based socio-technological innovations that promote good governance and convenience to residents (Harrison & Donnelly, 2011). A smart town is a wired town, an intelligent town, or an information town, where ICTs provide citizens with information that helps them to sustainably manage the infrastructure and socio-economic being of the town (Kudva & Ye, 2017). Policies on achieving smart towns encapsulate citizen engagement, economic development, and other digital interventions that translate to the improvement of the day to day living (Wiig & Wyly, 2016). Engaging the public and improving service delivery has the potential to improve the standard of life of the citizens. The establishment of a smart town can improve resource utilisation, innovation, as well as enable the town to attract new investors (ictQatar, 2014).

The integration of ICT in improving the management of various services in a town is one way that promotes the sustainable management of resources, together with other socio-economic enablers. At the core of smart towns is the integration of the physical infrastructure with the virtual world. Technologies such as the IoT that collect data in real-time can be used to monitor garbage, water levels, traffic jams, and also provide information related to services. Globally investors have poured over 1.2 USD trillion for the development of new products which are expected to be supported by over 25 billion IoT devices that will support smart vehicles, smart houses, and smart cities (GSMA, 2018).
3. Context of the research: locating the gap

In response to the quest to transform a rural university town into a smart town, an app was developed that enhances student engagement and improves the standard of life on campus. Mobile phone penetration in Zimbabwe reached 110% in 2016, while fixed landline phone ownership was less than three per cent (Lancaster, 2016). Smartphone ownership among university students is high, with Mupfiga et al. (2017) concluding that 81 per cent of Zimbabwean university students owned a smartphone or a tablet. High smartphone ownership by students will ensure utilisation of the app. La Hanisi et al. (2018) concurred that smartphones have become so embedded in the lives of university students who spend most of their time on social media, sharing multimedia content and for learning purposes.

This research relates to various studies on the use of mobile technology to improve teaching and learning environments. For example, a study conducted by Tunjera et al. (2014) in Zimbabwe, investigated how mobile apps could be used to address constraints associated with limited access to learning resources, collaboration, and interaction between lecturers and students. Maketo (2018) conducted another study on using mobile phones to support collaboration between learners and to provide access to content, and this increased subject comprehension. Gardner and Davis (2014) noted that students valued accessibility, immediacy, and efficient access to personalised information, and this facilitates interaction amongst themselves. Using mobile apps allows students to work independently (Caballéa et al., 2010). Pechenkina et al. (2017) contended that mobile apps were meeting the demands of today’s learners who prefer personalised learning. While these studies are valuable, very few focused on rural contexts, such as that of LSU, or focused on student engagement which promotes the concept of a smart university town.

Student engagement includes a variety of activities that enhance their learning environment through classroom and non-classroom based activities. Student engagement is a complex process involving activities such as teaching and learning, university life and how students engage with various communities (Bryson, 2014). Peters et al. (2018) posited that student’s engagement demands institutions to support student-based activities and provide effective communication channels for their voices. Student engagement is intended at optimising the student experience and improving the learning outcomes which help in developing the student and maintaining the institution’s reputation (Trowler, 2010). Student engagement may include extra-curricular activities such as supporting participation in social clubs, fund-raising for student projects and community service, among others. This study adopts the definitions by Bryson (2014), Peters et al. (2018), and Trowler (2010). The proposed app offers students services such as voting for their leaders and accessing transport schedules.

4. Methodology

The study employed design science research methodology (DSRM) whose philosophical orientation is pragmatism (Hevner & Chattejee, 2010). Pragmatism attempts to answer research questions by bridging science and practical action, resulting in the creation of artefacts that solve real-world problems. DSRM has been viewed as an intermediary between theory and practice within the Information System community (Goldkuhl & Sjöström, 2018). DSRM has been used to develop artefacts that attempt to address existing societal problems, and the artefacts can take the form of an instantiation, model or design theory (Vaishnavi & Kuechler, 2015).

MyLSU app was designed to enhance student engagement at the university, and promote the concept of a smart town. User-centred design (UCD) is anchored on identifying the needs of the users from their perspective and then using that knowledge to develop very functional systems (Kramers, 2007). UCD is a philosophy and approach that originated from human-computer interaction, which places the users at the centre of any design, from conceptualisation to testing (Lack, 2007). When potential users are involved throughout the stages of the development process, it is easier to establish and eliminate bugs in the early stages of the design that could impact on usability and functionality at a later stage. The processes followed in this methodology increase
the usability of a system, through focusing on attitudes and behaviours related to the user’s task, rather than on that of the developers; consequently, users do not have to adapt to the final system (Kotamraju & van der Geest, 2012). DSRM and UCD were integrated during the development of the artefact, resulting in the creation of high-quality products that meet the expectations of users (Bias & Mayhew, 2005; Kotamraju & van der Geest, 2012). A four-step-cycle UCD was adapted from Rubin and Chisnell (2008) to guide the mobile app development process, as explained in Figure 1.

4.1. Research
This stage of the UCD allows the researcher to gain a better understanding of the problem at hand by acquiring relevant knowledge to solve a real-world problem (Pascal et al., 2013). Tranfield et al. (2003) advocated for synthesising knowledge that is available within the domain. The DSRM’s first stage involves understanding the goals of the organisation, problem to be solved, available technology, and the opportunities (Hevner et al., 2004). User goals were defined, as well as the tasks that had to be executed and future needs, thereby grounding the design work. The goal of this research was to contribute to the creation of a smart town through the development of an app that fosters student engagement through improved access to university services.

4.2. Ideation
A rural-based university in a developing country context can be creative and come up with ideas that improve student engagement and experience during the students’ education tenure and contribute to the creation of a smart town. In this study, students contributed to this discourse; the researcher involved students in the formulation of the ideas that could enhance student engagement by using the app. The DSRM’s second stage determines the relevance of the solution, and this was done through reviewing available literature (Hevner et al., 2004). Research carried out by Magnusson (2009) revealed that end-users could contribute immensely to ideation. The creative potential of end-users is based on their lack of technical knowledge. Ericsson and Sony successfully involved students in developing an app for the P800 mobile phone (Magnusson, 2009). In this study, students were eager to contribute ideas, in anticipation of improved access to academic and social information, which would create a conducive learning environment.

4.3. Prototype
During iterative product development, prototyping is used to transform the idea into a physical or logical product that captures the basic features of the target product (Schrage, 2013). The transformation of the idea may represent the partial or full functionality of the product or display reasonable functionality to meet a particular goal (Rubin & Chisnell, 2008). The goal of DSRM is to provide utility in the development/build phase, and the theory is turned into a product that solves

Figure 1. Four-step-cycle UCD adapted from Cambur et al. (2017).
a real-world problem (Hevner et al., 2004). Kelley and Littman (2006) noted that prototypes have the advantage of identifying and containing errors in the early stages of the design and help developers to create inexpensive models, with quicker user buy-ins, and this increases the acceptability of the system. Low fidelity prototypes, in the form of paper-based sketches, were used to present these ideas to the target users. The primary back-end services for this app were processed through a MySQL database while PHP and Java were the main programming languages. After gathering the views of the potential users, the design of the database and user interfaces commenced. The users interacted with the app through navigation menus. Potential users were presented with prototypes of the app, and the designs were refined through an iterative process using user feedback to improve functionality.

4.4. Evaluation
After the development process is completed, the product is evaluated and tested for usability and usefulness through user observations (Lazar et al., 2010). Some scholars noted that DRSM was geared at improving the context of users, and therefore, the artefact must be evaluated (McKay et al., 2012). The results of the evaluation can be used in contributing new knowledge to the domain (Hevner et al., 2004). Different techniques can be applied to evaluate the prototype, such as heuristics and validation. MyLSU app was evaluated using a hybrid evaluation technique.

5. Theoretical framing: the technology acceptance model
The technology acceptance model (TAM), developed by Davis (1989), provided the theoretical framework for the study and was used for evaluating the student’s overall intention to use the app. Two important individual constructs of the TAM are perceived usefulness (PU) and perceived ease of use (PEOU), which influence the attitude of a user towards using a particular information system or technology. The user’s behavioural intention to use a system is influenced by the user’s perception regarding the system’s easy to use and usefulness. The TAM aligns well with the chosen methodology, as the two have related constructs. DRSM focuses on developing useful artefacts to solve existing real-world problems, while TAM seeks to evaluate the usefulness, usability, and reliability of the artefact (Hevner & Chattejee, 2010; Vaishnavi & Kuechler, 2015). TAM has been applied in studies related to mobile apps and learning, and has been validated, and proven to be reliable (AlEnezi et al., 2011). The TAM and its variants have been applied widely in studies conducted in developed countries; however, few studies have focused its application on the adoption of technology in a developing country like Zimbabwe.

5.1. Perceived usefulness
Refers to the degree to which using the MyLSU app would improve student engagement and promote the concept of a smart town. Perceived usefulness of the app is based on the utility it provides to the users.

5.2. Perceived ease of use
Using the MyLSU app would enhance access to university resources, would be simple, easy, not require much effort, and I would not require any assistance.

6. Requirement gathering techniques
At the core of the app were user experience and functionality. A total of 10 students partnered in the development of the app; each student received an airtime recharge card worth USD 2.00 as motivation to participate in this research. Following UCD guidelines, the researcher held discussions with potential users to solicit information needed to design the app. The final version of MyLSU app is shown in Figure 4. The requirements gathering was through an iterative process during the ideation phase of the UCD. The initial stage encouraged the students to conceptualise the problem, and the following points were raised.

• Login using personal credentials for authentication
• View results and coursework.
• Access calendars.
• View financial records.
• Receive notifications.
• Online voting to elect leaders.
• Access to bus timetables and shuttle routes.
• Access to campus entertainment and updates.

The user requirements were consolidated and were used to develop the mobile app architecture, as illustrated in Figure 2.

6.1. Overview of MyLSU app
UCD and user experience guidelines were used for the development of MyLSU app. Figure 3(a) shows how a student interacts with the system through a use case. This study used use cases, as they support a user-centred approach to specify system requirements. Use cases can help to delimit the app’s boundaries. The grid-view layout was used for the home screen using a scrollable two-dimensional grid, as shown in Figure (3b) (Android Developers, 2017). The mobile app extracts data from the university databases. Modular testing was conducted for functionality by downloading the app on a real mobile phone. The student is the main actor, who interacts with the system to access information regarding calendars, transport timetables, notifications, academic records, voting, financial records, and campus entertainment updates, as set out in Figures 4, 5,
Figure 4. Screenshots showing log screen and fees balance.

Figure 5. Screenshots of academic results and entertainment information.

Figure 6. Screens for voting for the SRC president.
and 6. Each user's login credentials were encrypted and stored in the database to ensure the confidentiality of the information.

6.2. Testing
Iterative tests were done during the design and development of the initial prototype, and user feedback was used to align the designs to the needs of the user. This was in line with the recommendations of Rubin and Chisnell (2008), they concluded that iterative testing reduces development time and quickly provides some functionality that can be demonstrated to potential users. Design flaws were identified and corrected early on; this reduced usability problems drastically. Potential users were observed as they attempted to complete tasks using MyLSU app. Usability tests were performed in the students' natural environment such as lesson breaks, in the library, or during lunch breaks.

6.3. Evaluation matrix
MyLSU app was evaluated on the following criteria based on TAM:

- Overall design;
- Functionality;
- The usefulness of the app;
- The simplicity of the app.

7. Methods

7.1. The sample
Of the 350 registered students for a social science degree program, 220 students participated in the evaluation of the app, of which 58% were female and 42% male. Undergraduate students constituted 65%, and the average age of the participants was 22.6 years, implying that the students belonged to the “digital native” or “net generation” as coined by Prensky (2010). The questionnaire was piloted to ensure that it adequately covered the main concepts, and user feedback was incorporated. The students were asked to evaluate the app by using a questionnaire that was embedded in the app. Embedding the questionnaire ensured that participants evaluated the app immediately after usage, and this resulted in better evaluation results. The questionnaire covered demographics; ownership of ICTs; perceived usefulness; and perceived ease of use. The instrument used a 5-point Likert scale, where 1 represented “Strongly Disagree” and 5 “Strongly Agree”. A Cronbach alpha value of 0.839, was observed across the constructs, and this was considered appropriate and acceptable, as it was above the 0.7 minimum threshold set by George and Mallery (2003). The data was analysed using SPSS version 21 software to compute descriptive statistics, means, and standard deviation.

7.2. Ethical clearance
Ethical clearance was granted by the university to conduct this research. The questionnaire explained that participation was voluntary and anonymous. Participants were informed of their right to withdraw if they no longer wished to participate. Students who participated in the study were assured that information gathered would be kept confidential and that it was not going to be used to influence their academic work. The identities of the respondents remained anonymous, and their responses were used for the production of this article only.

8. Results
A total of 220 students completed the questionnaire, giving a response rate of 62.85%. The study found out that 95% of the students owned a mobile device, and 35% owned more than one mobile device. About 40% of the students owned a laptop, while only 10% owned a desktop computer, and none had a fixed landline phone. The results are in line with findings by Lancaster, 2016), who established that mobile phone penetration had reached 110% while fixed landline phone
ownership was less than three per cent. These findings are consistent with a study that was carried out in South Africa, which revealed that 88% of the participating students owned a mobile phone and that some of them owned more than one device (Ruxwana & Msibi, 2018). The results are also in line with findings by Byungura et al. (2018), they established that 62.5% of the students in Rwanda had access to a smartphone, 32% of the students had access to a desktop computer, and only 12.3% had access to a cable network.

Concerning the design of MyLSU app, three design questions were used for evaluation, 77% of the participants agreed that the app loaded quickly, had good graphics and consistent navigation. Other scholars have noted that apps that are not prone to errors and crashing would have better usability potential and better performance (Kendall et al., 2010). The result of this study revealed that the targeted users found the app to be usable and easy to learn to use, and they would not require any assistance to use it; this finding echo that of Jonas-Dwyer et al. (2012). One construct which measured the app’s perceived ease of use was simplicity, an aggregated score of 79% was recorded, implying that the participants agreed that MyLSU app was simple and easy to use, resonating with findings by Jonas-Dwyer et al. (2012), who posit that an app must be simple and easy to use.

The app’s functionality positively influences its adoption, as users derive value from the app, they would want to use it again. Results revealed that 85% of the participants agreed that the app was functional through three construct items. These items measured how easy the users interacted with the app, if the app provided the required information and if the participants would use the app in the future. The results show the app’s enormous potential and comparable to a similar evaluation of an ACE app in over 90 countries, which recorded a mean score of 83% concerning its design and functionality (Seow & Wong, 2016). The results are also similar to work by Alqahtani and Mohammad (2015), who concluded that Turkish students were satisfied with the mobile app and would recommend it to others.

Regarding the app’s perceived usefulness, participants were asked to evaluate the app based on three construct items. The items measured how the app enhanced off-classroom engagement, provision of information that improved the student’s campus life and information that could help the institution engage with its students. An aggregate score of 70% was achieved. When students are satisfied with the functionality of an app, they may recommend it to others, as shown by the study by Seow and Wong (2016).

The aggregated scores are above 70%, and this shows that the majority of the students believed that the app enhanced engagement and offered functions that promoted a smart university town concept. Despite the university being in a remote rural environment, the mobile app provides functions that enabled students to experience services that would be generally offered by a smart town. The mobile app enabled students to access resources that improved their life on campus by improving access to information from anywhere and at any time. Access to information enhances the students’ affinity to the university and enhances student engagement, thereby promoting the concept of a smart town. The value of the standard deviation that was observed was low, ranging from 0.470 to 0.503, as shown in Table 1. This means that the responses are close to their central tendency.

9. Discussion
Universities in developing countries with limited resources may not be able to acquire a full set of technological resources that enable them to offer a full suite of smart town facilities. Smart town technological resources include IoT controlled devices, RFID, big data and data analytics. To remain competitive universities must adapt to the needs of their stakeholders by embracing technological tools that support the changing learning needs of the students. A rural university like LSU can take advantage of improved access to mobile devices and improve the learning and living environment of the student through a digital transformation. The transformation can be
Table 1. App evaluation response rates

| Survey item                                                                 | A   | N   | Mean | SD  |
|-----------------------------------------------------------------------------|-----|-----|------|-----|
| MyLSU app is simple and easy to use                                         | 0.79| 220 | 4.60 |     |
| I would find it easy to get the information I want from MyLSU app           |     | 220 | 4.70 | 0.77|
| MyLSU app would be simple to use                                            |     | 220 | 4.56 | 0.52|
| My interaction with MyLSU app would be clear and understandable              |     | 220 | 4.55 | 0.65|
| MyLSU app is functional                                                      | 0.85|     | 4.55 |     |
| It is easy to interact with MyLSU app                                       |     | 220 | 4.31 | 0.48|
| MyLSU app provided aggregated information supporting my needs              |     | 220 | 4.62 | 0.51|
| I would want to use MyLSU app always                                        |     | 220 | 4.71 | 0.72|
| Perceived Usefulness                                                        | 0.70|     | 4.48 |     |
| MyLSU app will enhance my off class engagement                              |     | 220 | 4.39 | 0.76|
| MyLSU will help the university engage with its students.                    |     | 220 | 4.62 | 0.53|
| MyLSU app will provide information that improves my campus life             |     | 220 | 4.44 | 0.82|
| MyLSU App is designed well                                                  | 0.77|     | 4.40 |     |
| I liked the design of the graphics and menus                                |     | 220 | 4.28 | 0.86|
| MyLSU app loaded quickly                                                    |     | 220 | 4.52 | 0.68|
| The app’s navigation was consistent.                                        |     | 220 | 4.40 | 0.48|

achieved by deployment of interactive mobile apps that enable students to connect and provide new campus experiences. Improved access to information and services can enhance the management of resources at the university, thereby improving the quality of life of the students and effectively promoting the concept of a smart town. Such interventions enable the university to engage with its students and remain relevant to their needs and expectations.

The evaluation results showed that the app offered aggregated information and services that enhanced student engagement and improved their campus life. Participants perceived that MyLSU
app was designed well, simple to use, useful, and functional. The app improved the student’s
campus experience and ensured that the students felt informed and enlightened through
improved access to academic, social and information related to events. The app was used to
aggregate information from disparate sources that students rely on for their day to day living at
a university and services such as voting to elect student leaders. Students are therefore unlikely to
miss information on important extra-curricular activities and announcements from the institution.
The app created a sense of affinity to the university and belonging for the students through
improved access to information. The paper argues that using MyLSU can go a long way in
promoting smart services and digital technologies that can transform a university campus into
an emerging smart town.

10. Recommendations
Deploying IoT devices can transform the university into a smart town. Fonseca (2018) posited that
IoT enabled apps presents an opportunity for making decisions that promote sustainable manage-
ment of resources. The app could be integrated with Radio-frequency identification (RFID) tagged
devices, which can enable the university to smartly monitor electricity usage, litter levels, water
levels, and pollution.

11. Conclusions
DSRM and UCD were successfully used to develop a mobile app. This study contributes to the literature on
technology adoption in developing countries. This research proves that institutions from developing
countries can utilise digital technology to enhance student engagement. For a resource deprived rural
institution, such innovative ideas can improve the experiences of students on campus. Institutions should
come up with strategies that help in creating an environment that can help engage their students to create
a conducive environment for teaching and learning. Participants agreed that the app enhanced engage-
ment and offered functions that promoted a smart university town concept such as voting and access to
social information. The research highlighted the limitations of this app and proposed how these could be
addressed in the future. The sample size used to evaluate the app was relatively small, which affects the
generalisability of the results. The app was developed for the Android market, as it controls over 80% of the
global operating system market—almost 100% in developing countries (Gartner, 2016). The app should
also be developed to cater for the iOS market also. This article serves as a space for other researchers to
problematise this study, intending to improve the app and promote the concept of smart towns further.
The results of this research will help policymakers, educators, and technologists to refine the app features
and content to improve student engagement. Recommendations proffered in this paper can help research-
ers to explore how mobile apps can be used to promote smart towns.

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