Towards a mobile centric framework for inclusive sustainable interactions

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Abstract

Developing countries in general, and South Africa in particular has shown phenomenal growth in the mobile cellular technology sector. Providing mobile cellular access to information and services has ushered a new era of challenges and opportunities for Higher Education Institutions. The aim of this article is to investigate students' needs and expectations regarding mobile cellular technology access to services, content and participation mechanisms in an Open and Distance Learning (ODL) university context. The research methodology is qualitative, with document analysis and a survey as data capturing strategies. The contribution of this article is to refine existing categories of students' needs regarding mobile phone access and make recommendations about providing mobile cellular technology access to services and content in an ODL university context.

INTRODUCTION

South Africa is a developing country that has shown phenomenal growth in the mobile sector, with many people taking advantage of the information era by gaining access to content and services (World Wide Worx 2011). South African mobile networks report 63-million active mobile accounts, this number can be translated to a mobile penetration of 126 per cent, but they argue that with the widespread use of dual-Sim cards, their research puts the true penetration to roughly 80 per cent (World Wide Worx 2011). That implies that 40 million South Africans are mobile phone users (Goldstuck 2012, 1--26). A report by the

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International Telecommunication Union estimates the mobile cellular phone penetration rate in South Africa to be 90 per cent (ITU 2009), but during the same year other sources estimated it to be 100 per cent (Cellular News 2009). Some studies provide evidence that mobile phone adoption is a contributing factor in reducing the digital divide (Boyera 2007, 12--14) and has resulted in an increase in the demand for mobile content and services in developing countries (Donner and Gitau 2009, 1--11). Kelly and Minges argue that 'developing world is following a different, 'mobile first' development trajectory' (Kelly and Minges 2012, 217). In their deliberations they conclude that mobile phones have become a dominant communication channel that can empower users in resource constrained communities to effectively contribute and participate in the knowledge economy. However, there are social and technical challenges that have to be managed to allow optimal use of mobile cellular technology in accessing content and services.

Albrecht and Pirani contend that students are primarily mobile and are accustomed to incorporating their mobile devices' information capabilities into their daily routines (2009, 1--19). A study on technology usage in South Africa found students to be mobile primarily, while institutional policy makers and academics were pc-primary (Donner and Gitau 2009, 1--11). Considering distance learning, Muyinda, Lubega and Lynch (2010) found that traditional distance learning student support models depend on hardcopy study guides, modules and residential sessions but recent efforts in integrating ICTs into student support systems should benefit from the opportunities offered by mobile phone access (Muyinda, Lubega, and Lynch 2010, 37--46). Therefore, there is a need to recognise the mobile information access needs of mobile primary users and to develop strategies that support mobile cellular technology access to services, content and participation at institutions of higher learning.

The purpose of this case study is to investigate students' needs and expectations regarding mobile cellular technology access to services, content, and participation mechanisms in open distance learning by studying one ODL university-- namely, the University of South Africa (Unisa). Unisa is South Africa's largest Open and Distance Learning (ODL) Higher Education Institution (HEI). The next section provides a brief literature review on mobile information access, and the Unisa context is discussed together with the content, services and participation mechanisms currently offered by Unisa. This is followed by an explanation of the research methodology, the presentation of the results and findings, as well as the conclusion.

MOBILE INFORMATION ACCESS

To understand students' mobile cellular technology access needs and expectations we start by reviewing mobile cellular technology information access literature. In this section, we review the literature focusing on motivations for mobile cellular technology information access. *Mobile information access* is a broad term but in this article it is used to refer to mobile cellular technology information access.

Approaches to investigating mobile cellular technology information access

There are two general approaches to investigating user information needs:

- The first approach considers what information users search for and how they search for that information (Church and Smyth 2009, 247--256). Analysis of query logs on major web search engines such as *google* (Kamvar and Baluja 2006, 701--709), and *yahoo* (Baeza-Yates, Dupret, and Velasco 2007, 1--6), have provided insights on the types of content accessed through mobile phones. The studies found commonly accessed resources to be entertainment, commerce, travel, employment, games, health, and social interaction.
- The second approach examines why users search for information (Kamvar and Baluja 2007, 58--62; Kellar, Watters, and Shepherd 2006, 1--22). Some studies have, considering the types of content that users access, tried to find the motivation behind mobile information access and express that as usage spaces (Cui and Roto 2008, 905--914; Taylor, Anicello, Somohano, Samuels, Whitaker and Ramey 2008, 2679--2684; Van Biljon, Kotzé, and Marsden 2007, 523--526). Cui and Roto (2008) found the motivations to be information seeking, communication, transaction and personal space extension. Van Biljon et al. (2010) distinguish the *core spaces*, which a user expects to have from the *additional spaces* that enhance user experience. The core spaces were identified as (1) relationships, (2) personal information, (3) organisation, (4) safety and (5) security. The additional spaces were identified as (1) entertainment, (2) m-commerce, (3) expansion, (4) non-personal information, (5) personal history and (6) image. Taylor et al. (2008) classify the motives for mobile information access into utilitarian and hedonic. They argue that utilitarian motives are derived from the need to use mobile phones for convenience, restrictions at work or lack of alternative access. Hedonic motives are a result of curiosity, social connection, and social avoidance. Church and Smyth (2009) found the motivations to be informational, geographical, and personal information management.

The synthesis derived from comparing, contrasting and integrating variables describing mobile user needs (Baeza-Yates, Dupret and Velasco 2007, 1--6), as well as variables motivating mobile information access (Cui and Roto 2008, 905--914; Taylor et al. 2008, 2679--2684; Van Biljon et al. 2007, 523--526; Church and Smyth 2009, 247--256) is presented in Table 1.

Table 1: Needs and motivations for mobile information access

Information Seeking	Communication	Transaction	Personal Space Extension
Personal Information Non Personal Information Awareness	Organization Relationships Safety and security Social connection	M-commerce	Expansion Image Entertainment Personal history Restrictions at work No computer at home Curiosity Social avoidance

RESEARCH CONTEXT

Unisa's ODL policy is entrenched in providing open learning, student support, flexibility in methods and criteria for assessing the learning process (ODL Policy 2008, 1--13). The diverse backgrounds of students enrolled at Unisa introduce disparities in levels of exposure to accessible technological infrastructure (Sonnekus, Louw and Wilson 2006, 44--53). The university introduced a number of support initiatives for facilitating students' access and interaction with learning services and content. These initiatives include administrative, personal and academic support, all of which have a strong technological support basis. The technological support provided by Unisa includes an e-learning portal, email, DVDs, telephone video conferencing and Short Messages Services (SMS).

The administrative and technological support initiatives reduced learner support problems (Roberts 2005, 1--14), but could not eliminate all problems, owing to the fact that most rural and township students only access the resources at regional centres, and have no access at home (Quan-Baffour 2005, 36--43). Disadvantaged students cannot afford to purchase computers and Internet resources. Furthermore, rural areas lack infrastructure that is required for the

functioning of a computer such as electricity and broadband connection (Fuchs and Horak 2008, 99--116).

Mobile phones can overcome most of the constraints people in rural areas experience and can enable them to participate and contribute to the information society (Botha, Van Greunen, and Herselman 2010, 1--8). The following exemplify the point:

- Studies on mobile phone adoption in South Africa found that they bring information access to areas where it never existed before (Donner and Gitau 2009, 1--11; Kreutzer 2009, 43--57).
- A mobile phone provides access to different kinds of media such as news, television, radio, email, SMS and Internet (Brown, Campbell and Ling 2011, 144--158).
- A Mobile phone provides access to a multitude of services (Kelly and Minges 2012, 217).

Given the prolific mobile phone adoption in South Africa (Goldstuck 2012, 1--26), most Unisa students have access to a mobile phone irrespective of their geographical residence, with conservatively 80 per cent (Goldstuck 2012, 1--26) to 90 per cent mobile phone ownership (Makoe 2010, 251--257). The phenomenal growth in the mobile sector with the vast majority of the population gaining access to the information services and content has opened new challenges and opportunities for HEI's and raises questions on how HEI's should respond. The following sections describe Unisa's response to these challenges. A document analysis of the Unisa policies on cellular mobile phone access is presented and the mobile information access tools currently provided by Unisa are reviewed.

Unisa policies

To gain an understanding of the official stance on Unisa mobile information access, the following policies were analysed: (1) ICT policies, (2) Library policies, (3) Curriculum policies, (4) ODL policies and (5) Tuition policies as accessed in September 2012. In this section we provide more detail by stating the purpose of the policy and the commitment to mobile information access.

Open and distance learning (ODL) policy

The purpose of the ODL policy is to:

- Position Unisa as a leading provider of higher education opportunities through ODL nationally, on the African continent and internationally;
- Commit Unisa to the guidelines for cross-border provision developed by the

national Department of Education;

- Commit Unisa to an ongoing, responsive interaction with current and emerging national and international imperatives and developments with relevance to quality ODL provision.

The ODL policy (2008, 1--13) promotes the use of educational and social technologies in appropriate and innovative ways that improve the quality of teaching and learning. Unisa commits to using interactive mobile cellular technologies for learning and communication. Interactive mobile cellular technologies used at Unisa include voice telephone calls, SMS, and MMS. The policy emphasises the use of interactive multimedia between students and lectures, students and tutors, students and students, and students and the institution. The criteria for selecting media for interacting with students should be based on access and availability of the technology, pedagogical appropriateness and the integration of the media into a coherent experience.

Curriculum policy

The curriculum policy provides an overview of the principles according to which the curriculum will be developed. It encourages and provides support for the use of mobile cellular technology for effective teaching and learning (Unisa Curriculum Policy 2010, 1--19). The policy states that in supporting teaching and learning, Unisa will embed e-learning, m-learning, and a range of information and communications technologies (ICTs) as far as possible at the centre of the student experience. Furthermore, it is stated that the University supports staff members and students with training for the development, implementation, benchmarking and deployment of m-learning across the University.

Internet, electronic communication, and web management (IECWM) policy

The policy provides rules, standards and guidelines on the use of communication facilities and equipment and ensures the value of equipment and networks (Unisa Internet, Electronic Communication and Web Management Policy 2009, 1--12). The policy supports the use of mobile cellular technology on the University network and access to the University network and services externally through mobile cellular networks and wireless networks.

In summary, some policies, namely the ODL policy, Curriculum policy, and the IECWM policy explicitly state the commitment of the University in supporting mobile information access. In contrast, policies such as the library policies and assessment policy do not mention mobile information access explicitly.

Mobile information access tools

The University provides mobile cellular technology tools for accessing University services, learning material and participation in a learning environment. In this section, we provide an overview of the tools that have been implemented and are operational at Unisa. These tools include the SMS application tool, interactive voice response tool, mobile multiple choice questions assignment submission tool and the mobile version of the Unisa websites.

SMS application tool

The tool is used to communicate important notifications such as examination results, due dates for assignment, examination dates and registration dates to the students. SMS messages can be broadcast to all the students-- for example, announcing that the results for examinations are out or directed to a group of students-- for example, students registered for a specific course. SMS messages are also used to track courier parcels. A message indicating a track, trace number and dispatch date is forwarded to students.

Students use the SMS messaging tool to query the examination database for results by sending the message 'results + student number' to a given university telephone number. The examination database responds with the results or a message notifying that the results are not available.

Interactive Voice Response (IVR) tool

It is a tool that allows a computer to interact with humans using voice and *dual tone multi frequency signalling* keypad inputs. The IVR tool allows students to interact with the examination results database via mobile phone voice call. The tools uses a synthesised human voice that reads a simplified version of the portal content and the user can browse by dialling on the phone keyboard. Students access the IVR by dialling a given Unisa telephone number to access their results.

Mobile Multiple Choice Questions (MCQ) Assignment submission tool

In an effort to improve assignment submission and meeting submission deadlines, Unisa developed a Java mobile information device profile MCQ assignment submission tool. The tool is downloadable from the Unisa websites. To submit an assignment on the application, students must first log on to the system. If the login is successful, the students are presented with a screen where they can capture answers to the assignment questions, submit answers, receive an immediate confirmation for successful submission, and view the memorandum after submission.

Unisa mobile websites

Unisa has three official websites which are all accessible through both a desktop computer, web browser and a mobile web browser. The official websites are the students' e-learning portal (myUnisa), main website and the staff portal. All the UNIS websites were designed to provide a variety of online tools to academics, students and administrators.

The e-learning portal provides students with access to learning material, discussion forums, assignments downloads and uploads, announcements and contact details. Some of the functionality of the websites is accessible through mobile phone browsers while some are not.

Table 2 summarizes mobile cellular technology information access tools at UNISA and provides more evidence of the commitment towards supporting students in cellular mobile phone access.

Table 2: Mobile cellular technology information access tools at Unisa

Tools	Mobile content creation (Y/N)	Mobile access	Availability
SMS	Y	Y	http://staff.unisa.ac.za/secure/index2.jsp
Voice Response	N	Y	http://staff.unisa.ac.za/secure/index2.jsp
Podcast	Y	Y	https://my.unisa.ac.za/portal
Assignment Submission	Y	Y	http://mobi.unisa.ac.za/?page_id=2389
Mobile websites	Y	Y	https://my.unisa.ac.za/portal/pda http://mobi.unisa.ac.za http://staff.unisa.ac.za

METHODOLOGY

This research is based on the constructivist paradigm assumptions which states that 'realities are multiple, constructed and holistic', and, that the 'knower and the known are interactive and inseparable' (Lincoln and Guba 1985, 37). The constructivism paradigm is associated with qualitative research approaches, where understanding or meaning of phenomena is 'constructed through interactive participation of subjects giving their personal thoughts, feelings, experiences and their subjective views' (Creswell and Plano 2011, 44). The

objective is to understand students' needs and expectations regarding mobile cellular technology access to services, content and participation mechanisms in an ODL university context by focusing on Unisa as a case study. This implies three main activities:

- capture and present the Unisa (as example of an ODL institution) stance on mobile information access by documents analysis and observations of the tools and services as presented in the previous section
- capture students' needs, expectations, beliefs and meanings constructed around the issue of their information access by using an open-ended survey with three questions
- consider how well the offering of the HEI match students' needs and expectations.

The target sample of the questionnaire survey was Honours students registered for an e-learning course in the School of Computing. This group was purposively selected to provide an informed opinion on mobile information access since the e-learning course addressed issues of m-learning. We received 50 responses to the optional survey.

FINDINGS AND DISCUSSION

This section presents the results of the data analysis from the student questionnaire survey. The section reports on the general ODL information needs of students, mobile information needs of ODL students and mobile learning activities that students would want to do on mobile cellular phones. The themes that emerged from the analysed data are categorised in tables, with graphs showing the frequencies of themes expressed as a percentage that represents the students who mentioned that theme.

General ODL information needs of students

The first of the three questions pertained to ODL students' general information needs and asked the question: '*What are the information needs of distance learning students?*'

Out of the 50 scripts analysed, 24 themes on information needs emerged as students described their information access needs and expectations from the university. We categorised the themes into communication, transactions, and information seeking, according to the terminology of previous research on mobile information needs (Cui and Roto 2008, 905--914; Taylor et al. 2008, 2679--

2684; Van Biljon et al. 2007, 523--526, Church and Smyth 2009, 247--256). The emergent themes are presented in Table 3 and the frequencies of the themes' occurrences in Figure 1. A new category, used to refer to information sources that students need to access their studies emerged and we termed it *resources*. Arguably, this could be classified as information seeking; but given the HEI context, we found it necessary to recognise this specific need by introducing a category to represent *resources*. Personal space extension, as listed in the literature section was not mentioned and hence, omitted from the information categories for mobile learning in ODL HEIs.

Table 3: General ODL students' information needs

Communication	**Transactions**	**Resources**	**Information Seeking**
Reminders	Assignment submission	Reference article Downloads	Registration procedures
Announcements	Parcel Tracking	Study material	Rules and procedures
Talk to the lecturer	Students results	Assignment solutions	Contact details
Discussion forums	Students fees	Practice exams	Timetables
		Podcasts/vodcasts resources	Course Information
		Tutorial material	Maps and directions
		e-library	Unisa venues
			Student careers
			Research information

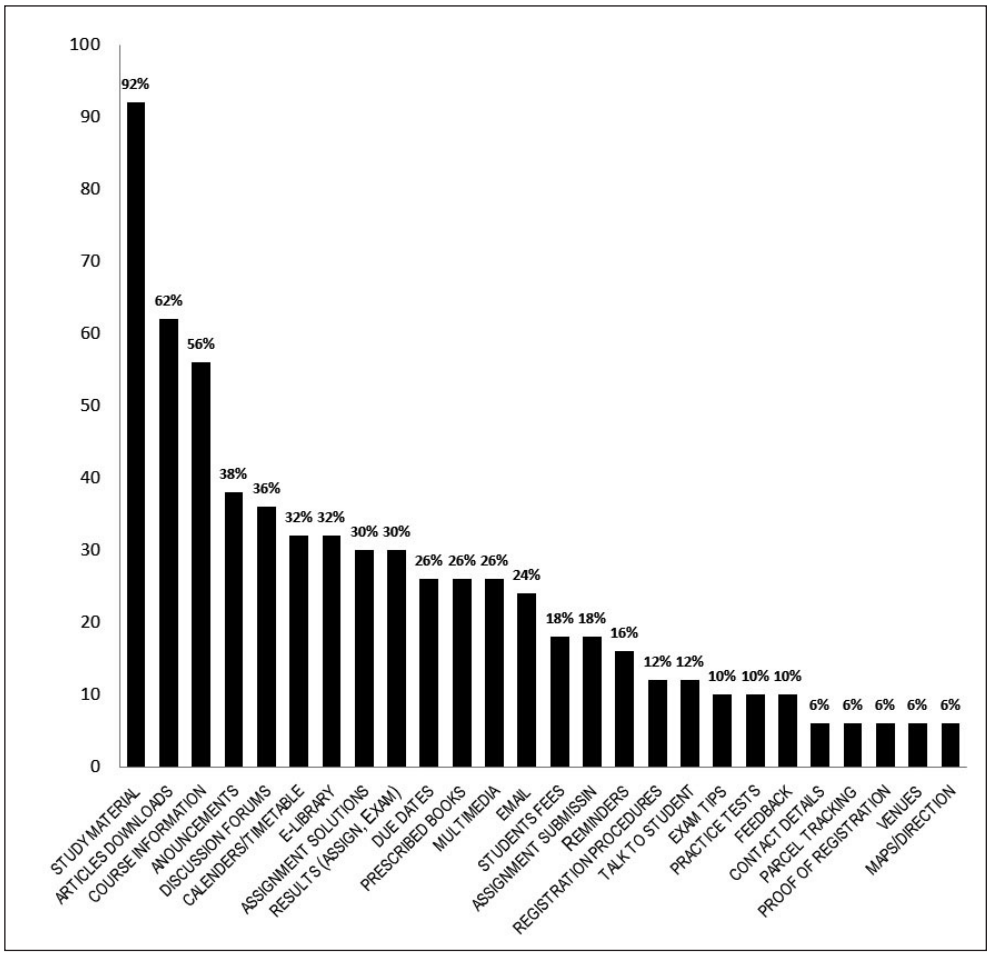

Figure 1: General ODL information needs versus the percentage of students who suggested it

Mobile information needs

The second question related to information obtained via a cellular mobile phone and was phrased as follows: *What kind of information do students prefer via a mobile phone?* From the 50 scripts analysed, 17 themes emerged. Following terminology used in previous research, the themes were categorised into communication, transaction, resources and information seeking. The categorised elements of the themes are depicted in Table 4, the frequencies of the themes are summarised by a bar graph in Figure 2, and then the categories are discussed in more detail.

Table 4: Categories of mobile information needs

Communication	Transactions	Resources	Information seeking
Feedback	Student results	Lecture summaries	Unisa venues
Reminders	Student fees	Practice exams	Timetable
announcements		Study material	Registration dates
Discussion forums		Self-assessment	Maps and direction
		Podcasts	Due dates
		e-library	

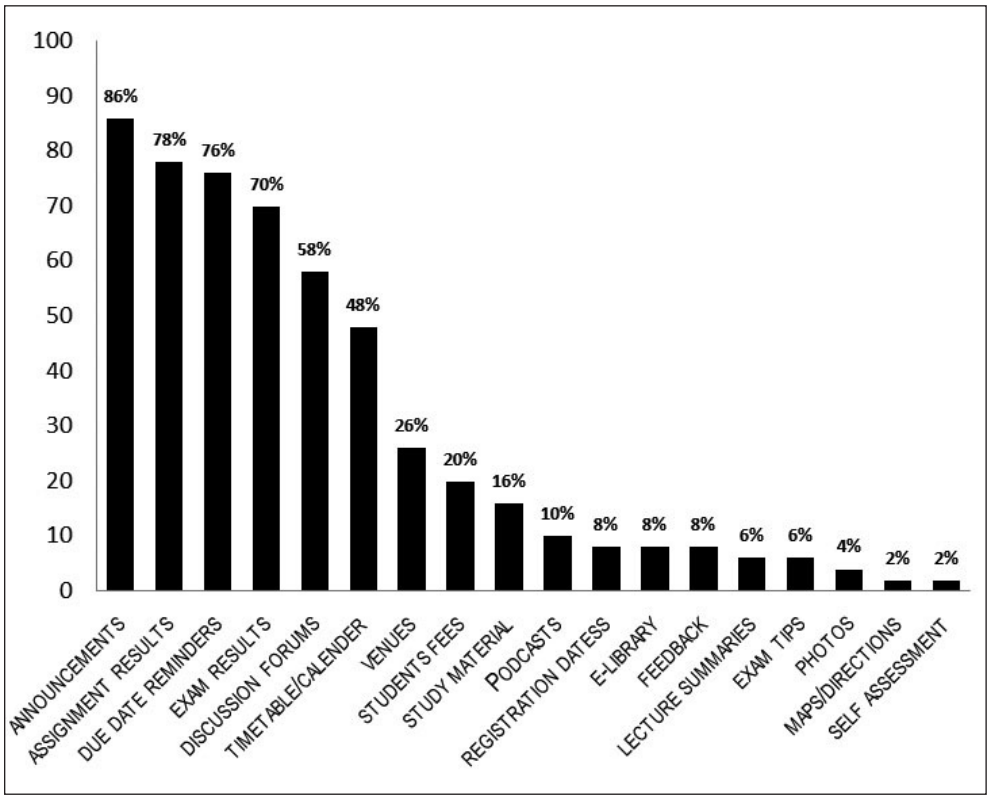

Figure 2: Mobile information needs versus the frequency of students that suggested the need

Communication information needs

The results indicated that students prefer to communicate with other students, lecturers and the university using text-based messages such as SMS and email.

The most popular mobile communication services that students expect to receive from the university were announcements, reminders, discussion forums and feedback. A large number of students (86%) preferred to receive text-based announcements regarding important information on their mobile cellular phones. These announcements should be presented as short messages, unambiguous and relevant to students' needs. Important information suggested by students included publicising examination results, research symposiums, discussion classes' dates, venues and time. Text-based services such as SMS, email, twitter and facebook were suggested as ideal communication channels for interacting with other students on matters that concerns academic work. In this regard, one of the students said:

> Students prefer receiving quick and relevant information via mobile phone as it allows them to be kept up to date with any advancement that has been made with regard to certain courses...

Students who expect to receive reminders for assignment due dates, scheduled tutorial classes, registration dates and examination dates on their mobile cellular phones constituted 76 per cent of the population. *Reminders* are important in ODL because students are often isolated. This means that if they forget about tasks such as submitting assignments, there is no one to remind them. *Feedback* emerged as a less important mobile information access need, with only 8 per cent mentioning it. One student said:

> ... Students' contributions are preferred to be regarded as private when receiving feedback as the mobile device is seen as belonging personally to them...

Fifty eight per cent of students mentioned mobile discussion forums as an important tool that enhances participation and interaction in the learning process. The students mentioned that mobile discussion forums allow them to follow topics of interest, irrespective of geographical location and time. Students can interact and establish relationships with other students and lecturers. One of the students said,

> Distance students are often not able to go to campus to collect materials and interact with fellow students and lectures. ... Discussions can also be easily done on mobile phones with the use of chat software which is easily available.

Information seeking needs

Themes that emerged under mobile information seeking relate to searching for time critical information --for example, information needed to select the right examination venue. Information-seeking themes that emerged from students

were timetables (48%), venues (26%), registration dates (8%), due dates (76%), as well as maps (2%). The students require that when such information is queried it should return the required specific information on a mobile cellular phone, rather than getting this information by browsing through the university website. In this regard, one student said,

> Students want to have access to relevant information. In many cases a whole lot of unrelated materials is mixed with the relevant material that students require and this causes problems when searching for information.

Transactional information needs

Themes that emerged under transactional information needs were querying student results and the balance on their fees. Transactions are online services that require a user to logon to a system and request for data that would return the results to the query. A large number of students (78%) suggested a service that runs on mobile cellular phone that enables them to query assignment results and examination results, while 20 per cent suggested a service that would allow them to query information relating to their fees. These services are of value to nomadic students and those who reside in rural areas.

Information resource needs

From the analysis of the questionnaire survey, important resources that students would like to access through their mobile phones emerged to be lecture notes summaries (6%), practice examinations (6%) study material (16%), podcasts (10%), and e-library (8%). The results show that few students see mobile phone as tools for accessing learning resources. Students prefer resources that do not require a lot of bandwidth because they are faster to download and less expensive. In this regard, one student said,

> Information that is smaller in size such as lecture notes summaries would be useful if they were to be accessed on mobile devices as these would be reviewed at the student's time.

The most important items for general information (see Figure 1) are study material (92%), reference articles (62%), course information (56%), announcements (38%) and discussion forums (36%). For mobile access these items (see Figure 2) are announcements (86%), assignment results (76%), due date reminders (76%), examination results (70%) and discussion forums (58%). From observation, the information items are very much the same, but the order is different with organisational aspects being prioritised in mobile information needs.

Mobile learning activities

The third and final question was: *What kind of learning activities do students prefer to do on a mobile phone?* In this section, we report on the analysis of mobile learning activities that the students suggested would like to make use of in an ODL environment. The 15 themes that arose from the data were categorised into communication, transactions and resources (see Table 5 and the associated frequencies in Figure 3). A further discussion for each category is given below.

Table 5: Mobile learning activities

Communication	**Transactions**	**Resources used**
Discussion forums	MCQ assignment	Listening to podcast
Telephone conversation	Course survey feedback	Downloading articles
SMS chatting		Study material
		Reading e-books
		Exam practice
		Sharing information
		E-library

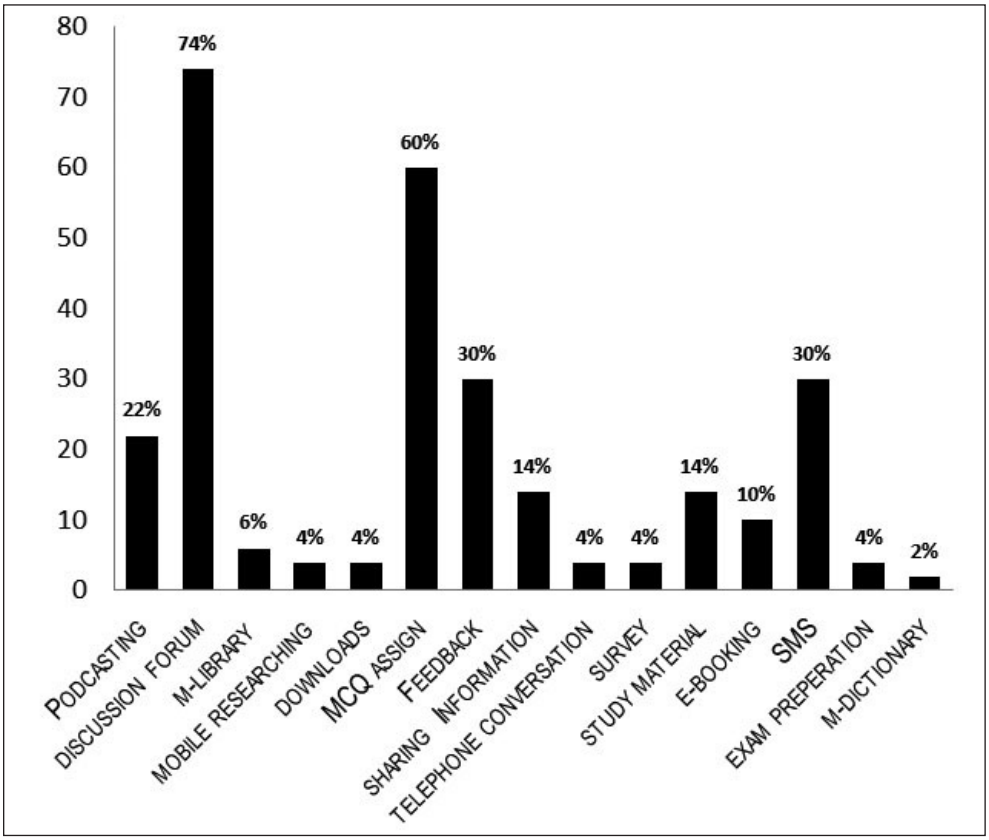

Figure 3: Mobile learning activities versus the frequency of students that suggested the need

Communication learning activities

These are activities that enable ODL students to communicate with other students, lecturers and to enquire from the university. Themes that emerged under this category included telephone conversations, SMS chatting, and discussion forums. From the 50 scripts analysed, 4 per cent of the students suggested telephone conversation, 30 per cent suggested SMS texting and 74 per cent suggested discussion forums.

Telephone conversation was unpopular, owing to the cost; this highlights the importance of the cost constraint for students in HEI. Despite the popularity of SMS in educational learning literature, and the fact that all mobile cellular phones can send and receive SMS text messages, only 30 per cent of the students suggested that they would like to use it. SMS was suggested as a communication means that would facilitate dialogue among students, but not between students

and lecturers. Note that the emergence of cheaper services such as *MXit, 2go, BBM and Whatsapp* may have influenced this response. Students also proposed receiving multiple choice solutions to assignments through SMS.

Discussion forums emerged as a popular activity, with 74 per cent of students voting in favour of it. Participation and interaction enhances social interaction among students and the lecturers. The students felt that interaction was important in enabling students to start learning communities, which are usually difficult in an ODL environment. Some students suggested that discussion forums give them an opportunity to ask questions and get other students' opinions, and encourage collaborative learning.

Transactional learning activities

Transactional learning activities that were viewed as essential in ODL include doing MCQ (60%) and giving course feedback (4%). Both activities are similar in that they do not require the users to enter a lot of text from the keyboard. MCQ's require the user to either choose an answer by clicking on radio button or to enter an alphanumeric answer. Students felt comfortable capturing and submitting MCQ's for marking. One of the students said,

> Assignments involving limited input (e.g. multiple choices questions) will be preferred on a mobile phone. This is due to the fact that text input is easier and faster. ...

Access to learning resource activities

These are real time contextual use of mobile cellular phones in accessing learning resources. The themes that emerged from students' suggestions included accessing podcasting/vodcasting, research articles, study material, reading e-books, examination practice questions, sharing information and e-library. Few students (14%) suggested that they would like to be able to download and read study material through their mobile cellular phones. This implies that the study material should be packaged in a format that is readable on mobile cellular phones. This would allow students to access study material at any place at any time. Similarly, 4 per cent of the students suggested that they would like to be able to download research articles, and 4 per cent suggested access to examination practice questions on their mobile cellular phones. Only 22 per cent of the students indicated that they would like to listen to podcasts/vodcasts to supplement their reading while travelling, while 10 per cent would like to have access to e-books.

Towards understanding students' unmet needs and expectations regarding mobile cellular technology, we consider both the student's mobile information access needs and expectations, as well as the mobile cellular technology information services offered by the university. Table 6 compares the *general information needs* identified with the *mobile cellular technology information needs,* and whether that need is met by the institutional information offering.

Table 6: Comparison of general information needs against mobile information needs and mobile information access offered by the institution

General Information needs	**Mobile Information needs**	**Mobile Information access offered by the institution**
Announcements	Announcements	Yes (http://mobi.unisa.ac.za)
Assignment solutions	-	No
Assignment submission (Written)	Assignment submission (Written)	No
Contact details	-	Yes (http://mobi.unisa.ac.za)
Course Information	-	Yes (http://mobi.unisa.ac.za)
Discussion forums	Discussion forums	Yes (http://mobi.unisa.ac.za)
e-library	e-library	Yes (http://mobi.unisa.ac.za)
Maps and directions	Maps and directions	Yes (http://mobi.unisa.ac.za)
Multimedia course resources	Multimedia course Resources	Yes (http://mobi.unisa.ac.za)
Parcel Tracking	-	Yes (http://mobi.unisa.ac.za)
Practice exams	Practice exams	Yes (http://mobi.unisa.ac.za)
Article Downloads	Downloads	No
Registration procedures	Registration procedures	Yes (http://mobi.unisa.ac.za)
Reminders	Reminders	Yes (http://mobi.unisa.ac.za)
Rules and procedures	-	Yes (http://mobi.unisa.ac.za)
Counseling services	-	Yes (http://mobi.unisa.ac.za)
Students fees	Student fees	Yes (http://mobi.unisa.ac.za)
Students results	Student results	Yes (http://mobi.unisa.ac.za)
Study material	Study material	Yes (http://mobi.unisa.ac.za)
Talk to the lecturer	Telephone conversation	Yes (http://mobi.unisa.ac.za)
Timetables	Timetables	Yes (http://mobi.unisa.ac.za)
Tutorial material	-	Yes (http://mobi.unisa.ac.za)

General Information needs	Mobile Information needs	Mobile Information access offered by the institution
Unisa venues	Unisa venues	Yes (http://mobi.unisa.ac.za)
	Feedback	No
	Lecture summaries	No
	SMS chatting	No
	e-books	Yes (http://mobi.unisa.ac.za)
	m-library	Yes (http://mobi.unisa.ac.za)
	m-research	No
	m-dictionary	No
	MCQ assignment	Yes http://mobi.unisa.ac.za/?page_id=2389
	Course survey feedback	No
	Share information	No
	Self-assessment	No

Matching the general information needs with the mobile information needs showed that 68 per cent (23 out of 34) of the mobile information access needs were met. This does not imply a large gap between students' mobile access needs and Unisa's provision of content, services and interaction. However, the degree to which the information was adapted for mobile phone access has not been monitored, and some of the students' comments indicate that the response format is not always optional. This means that the mobile information need was met, but the satisfaction with the service provided needed investigation.

CONCLUSION

This study investigated students' needs and expectations on mobile cellular phone access regarding content, services and participation mechanisms provided at UNISA as an ODL institution.

From an institutional perspective the issue of cellular mobile phone access seems to be important and is being addressed proactively. This is based on the evidence that mobile information access was mentioned explicitly in three of the five policies evaluated. Furthermore, many examples of tools and services for cellular mobile phone access have been found as listed previously in the mobile information access tools section.

The findings from the survey provide insight into students' general information needs and their mobile information needs regarding access to services, content access, and participation mechanisms by distinguishing between these categories and customising the classification for the ODL context at HEI.

The main aim of the study is to shed more light on students' mobile information access needs in an ODL environment. A secondary contribution is to highlight the services, content access, and participation mechanisms for mobile cellular access provided by UNISA as an ODL institution.

The findings did not identify a large gap between students' needs and UNISA's provision of content, services and interaction. However, the degree to which the information was adapted for mobile phone access has not been monitored, and some of the students' comments indicate that the response format is not always optional for mobile phones. Therefore, further research is necessary to investigate the mobile format adaptation, and also to validate the findings with a larger group of participants.

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