

Access and Skill in Using ICT in an Open and Distance Learning Context—Students’ ICT Sophistication

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Abstract

A long-standing focus of research in higher education has been on monitoring the degree of student access to information and communications technology (ICT). Recent debates have moved towards a more nuanced understanding of students’ technological experiences and behaviour. As the world changes, so does higher education and expectations regarding the role of technology within this environment. Universities, which continuously strive to improve teaching and learning, need to accommodate students’ increased use of technology and enhance their proficiency and fluency in accessing and using ICT as these skills are required to succeed in education and in life after graduation. This paper proposes that access to ICT constitutes only one dimension of a more complex and elaborate construct, namely that of ICT sophistication, which concerns students’ level of ICT use, and their experience of and engagement and fluency in ICT. As a basis to evaluate the ICT sophistication of students at the University of South Africa, the researchers drew on the findings of the said university’s surveys conducted in 2011 and 2014. This evaluation also served as a method for segmenting the student body to inform interventions. The results obtained supported findings in the literature that “access” could not be fully understood by drawing a one-dimensional distinction between access and non-access.

Keywords: access; information and communications technology; ability; open distance learning; sophistication; higher education

Introduction

Amidst the many challenges facing higher education (HE), issues such as access to information, Internet connectivity and students' abilities to use information and communications technology (ICT) remain disputed in the South African HE landscape. As the world changes, so does HE and the expectations about the role of technology within this environment. Universities persist in aiming to enhance the teaching and learning experiences of their staff members and students; therefore they need to think carefully about how to increase technology usage and fluency of usage. Fluency is regarded as a requirement to succeed in education and in the work environment (Oliver 2012).

Recent debates have revolved around a more nuanced understanding of students' technological experiences (Bennett and Maton 2010). Against this backdrop, it could be argued that an important aspect of making a university successful, and in particular a university such as the University of South Africa (Unisa)—Africa's largest open distance learning (ODL) institution (with 350 000 students)—depends to a large extent on the institution's access to and effective use of technology and the ability of its students to use technology to improve their learning.

Some of the biggest concerns at Unisa relate to the use of technology within the institution and the uncertainty regarding students' level of access to computers, in particular students from lower socio-economic backgrounds. Investigating this last matter has been indicated as an institutional priority.

The aim of this paper is threefold. First it reports on the findings emanating from a survey study that Unisa conducted in 2014 to review the status of students' access and ICT ability within an ODL context. Second, it compares these findings to the baseline study that was conducted in 2011 to identify shifts in ICT usage. The third and primary aim is to consider the status of students' access and their ICT ability as underlying dimensions of measuring levels of students' ICT sophistication. The study therefore considers and evaluates the process of developing indices to provide measures of students' level of access to and ability to use ICT, and uses these as a method to segment the student body and as a model of ICT sophistication.

The significance of this research lies in its contribution to answering the call for participation in the discourse pertaining to the institutionalisation of e-learning in mega open universities (Panda and Mishra 2007).

Research Context

With its approximately 350 000 students in 2014 (Unisa 2014), Unisa is one of the world's largest universities. As Unisa aims to become fully online in the future, it is essential to determine its students' status of access to and ability to use ICT as these dimensions indicate the level of students' ICT sophistication. This knowledge will assist the institution

in its efforts to enhance the efficiency of teaching and learning. The benefit of conducting this type of research is not derived from its potential to make predictions: its benefit comes from facilitating an evidence-based approach to intervention.

During 2011, Unisa conducted a benchmark research study assessing students' access to ICT and their ability to use it. If students do not have access to ICT then many of the perceived advantages of using ICT for education do not translate into reality (Liebenberg, Chetty, and Prinsloo 2012).

The Unisa-wide research continued in 2014 to probe students' access to and ability to use ICT. To accommodate the shift towards measuring students' levels of ICT sophistication, this was an added focus in the 2014 survey in order to enable Unisa to provide the education that students needed and desired. Broadly speaking, this research aimed to provide intelligence that could be used to inform decisions within the framework of contributing to information about students so as to provide effective student support.

In the first place, the aim of this study was to investigate the construct of ICT sophistication as a measure that could serve as a profile or descriptor variable of the student population. In other words, the aim was to present a model—using a combination of variables—that could offer a view of ICT sophistication amongst students that would be better than a model using a single variable. Secondly, the research aimed to determine where the model could serve as a potential indicator or explanatory variable of student success and where it could be used to identify segments requiring ICT intervention and e-learning development. In other words, the aim was to explore how such a model could further our understanding of student behaviour and learning as a descriptor (profiling and moderating), predictor and mediator of learning.

Literature Review

ICT provides an increasing array of teaching and learning strategies that academic developers and specialists can choose from, for instance, strategies relating to system design, teaching and learning, and administering and managing teaching (Butcher 2011). Despite the increased use of ICT in HE settings, many HE students lack certain aspects of ICT proficiency required for the completion of university assignments (Seymour and Fourie 2010). It has become clear that having access does not lead to fluency of usage; therefore the focus on enhancing students' ICT proficiency should remain a key objective in the ODL environment (Liebenberg, Chetty, and Prinsloo 2012).

ICT is considered an important aspect in the connection between student learning and student success. At Unisa, this connection was fundamental to the process of developing the open-, distance- and e-learning (ODEL) model of teaching and learning.

Access to ICT only constitutes one dimension of a more complex and elaborative construct, namely that of ICT sophistication. This construct directly concerns students' level of use,

engagement in and experiences with ICT. Improving the level of sophistication can improve students' success and throughput. A common discourse in HE is the definition and emphasis of the plurality of digital literacy and the recognition of the gains of understanding digital literacy. The concept of digital literacy, a term that is now generally used, was introduced by Paul Gilster (Gilster 1997). Definitions of digital and information literacy are numerous, and, within this pool of definitions, terms are often used interchangeably, for example, "literacy" and "fluency." Terms such as digital literacy and competency are used to describe the ability to steer a path through digital and information environments to find, evaluate, and accept or reject information (Lankshear and Knobel 2008).

Methodology

The aim of this research was threefold: first, to consider and evaluate students' access to and ability to use ICT as two possible dimensions of ICT sophistication in the Unisa environment; second, to reflect on the status and trends of students' access to and ability to use ICT within an ODL context; and third, through following the aforementioned two processes, to consider and evaluate the process of developing indices from these two measures as a method to segment the student body as a model of ICT sophistication.

The research aimed to provide an understanding that "access" is a multi-layered process that entails more than just making a distinction between access and non-access (e.g. Brown and Czerniewicz 2010; Burbules and Callister 2000).

Unisa's 2014 study collected data to compare with the baseline information gathered in the institution's 2011 research. The statistical analysis, which was descriptive in nature, explored the data in order to determine the status of students' access and capabilities, and to compare the shifts and changes that could have occurred since the baseline research. The investigation attempted to contribute to establishing how technologically sophisticated Unisa students were and to use this information to segment the student body.

The key research questions were the following:

- What is the status of ICT access amongst Unisa students?
- What are the technological capabilities of Unisa students?
- How can these two measures provide a reasonable base towards a measure of ICT sophistication?

Research Approach

A quantitative research design was adopted for the 2014 study in order to support the key research objectives and ultimately guide and inform decisions. This design made it possible to compare the 2014 results with the results of the 2011 study (which had also followed a quantitative design) and to identify shifts and similarities over time.

In the 2011 study, there were two target groups of students. The first group was targeted via an online survey as part of the data-gathering phase, whereas the second group was provided with an equivalent paper-based version of the survey questionnaire. Both these target groups showed similar profiles in terms of access to ICT (in particular computers and the Internet) for study purposes. It was found that even though students might not have owned computers or mobile devices, they were resourceful in finding ways to be connected. For the 2014 study, the decision was made to gather data by means of an online survey only. This decision was prompted by Unisa's continued campaigning that students studying at Unisa should have access to both a computer and the Internet.

A structured questionnaire served as the data-gathering instrument. The 2011 questionnaire was used as the basis for the development of the 2014 survey instrument, with a few adaptations to cater for additional areas of focus. The questionnaire was posted on an online survey platform. An invitation with the link was sent to students via Unisa's learning management system, myUnisa. In order to improve response rates, an SMS was also sent to students' mobile phones prompting participation. This learning management system provided a suitable platform owing to students' high penetration of the myUnisa site as well as ease of access.

Response Rate

While the 2014 survey used a smaller sample ($N = 2\,194$) compared to that of 2011 ($N = 22\,216$), a comparison of demographics showed highly similar profiles amongst the student respondents, therefore providing a sample that compared favourably with the sample of the original baseline survey of 2011. However, compared to the overall Unisa student enrolment, some deviations were evident, notably an under-sampling of females (a sample proportion of 55% compared to an overall Unisa population proportion of 62%) and of Africans (a sample proportion of 46% compared to an overall Unisa population proportion of 71%).

Validity and Reliability

The researchers gave careful consideration to the research design and survey instrument in order to ensure acceptable measurement validity and reliability. External validity, which focuses on representativeness and generalisability of the results (Cooper and Schindler 1998), was mainly addressed by the sampling and survey methods. Internal validity was addressed by focusing on the instrument and what its intent was to measure in relation to the research aims. Content and face validity were addressed by means of a peer review of the instrument by fellow research staff members (experts) at the institution, and their opinion was elicited about there being major topic omissions or not. A further phase involved a pilot study amongst a selected number of respondents. Their feedback about the questionnaire was obtained through a cognitive interviewing process (Barry et al. 2011), assessing if they understood all the words used, if they interpreted the questions similarly,

if the layout was acceptable and if the researchers had the same understanding as the respondents of the wording of individual questions.

Criterion validity was assessed through a comparative analysis between the study and the initial baseline study done in 2011 as well as other similar research projects at the institution, particularly those relating to student module evaluation, student satisfaction and student profile (which concentrated in part on student ICT behaviour).

Analysis and Findings

The data analysis focused first on establishing the status of students' access to and their ability to use various ICTs. Secondly, the analysis worked towards defining and measuring ICT sophistication in an ODL environment.

Profile of Respondents

Figure 1 below reflects a comparison between the profile of survey respondents in 2011 and in 2014.

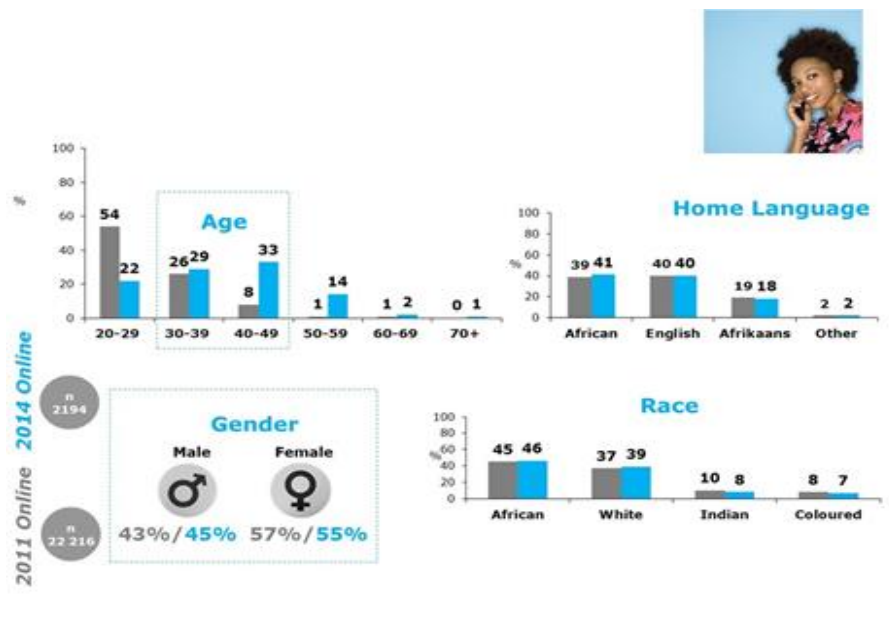


Figure 1: Profile of survey respondents in 2011 and 2014 by age, home language, gender and race

A comparison between the demographic profile of respondents in the 2011 and 2014 surveys showed very similar proportional distributions, in particular across home language, gender and race groups. Some deviation was evident across age groups.

The bulk of the participating students were African females, both in the 2011 and 2014 surveys, which is representative of the student body at Unisa. Most of the respondents were African or white females between the ages of 30 and 39 and between 40 and 49 and who spoke either English or an African language.

Status of Access to ICTs and Electronic Devices

As regards regular access to computers and/or electronic devices, nearly all respondents indicated they had access to or owned a laptop (88%) or a computer (72%). Significantly, many students had a smartphone (70%), but access to tablets was substantially lower (30%).

In Figure 2, the location from which students mostly accessed computers and/or electronic devices is presented.

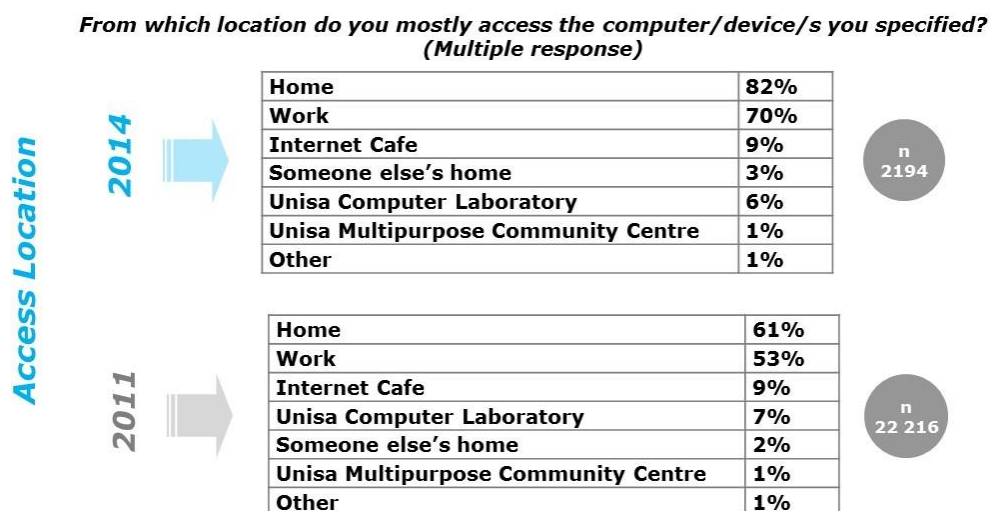


Figure 2: Access location

In general, as depicted in Figure 2, individuals had a wide variety of avenues through which to access ICT devices. In terms of location of access, there were some locations most students commonly made use of. The majority of respondents noted that they mainly accessed ICT devices at home (82%), at work (70%) and to a much lesser extent at Internet cafés (9%), at the Unisa Computer Library (6%) and at the Unisa Multipurpose Community Centre (1%). It is clear that data remained fairly stable from the 2011 survey to the 2014 survey. The level of use of the Unisa Multipurpose Community Centre and the Unisa Computer Laboratory remained low. However, compared to the 2011 survey, the 2014 survey indicated an increase in students' electronic access from home and work.

Status of Access to the Internet

According to the results, 99 per cent of students who participated in the 2014 survey had regular access to the Internet (in comparison to the 2011 survey that showed that 91% of students had regular access). This growth, which confirms the high prevalence of access to the Internet, is encouraging, considering that access to the Internet is a requirement for academic engagement at Unisa. However, it is important to note that elements such as navigation capabilities, ease of use and effective engagement with online content are crucial to success.

While a computer and a laptop remained common devices with which to access the Internet (59% and 74% respectively), it was evident from the 2014 survey results that mobile devices were becoming equally common access points. Continued growth in the use of a tablet as a medium, in particular amongst higher socio-economic groups, is also expected. Furthermore, the 2014 results revealed that 60 per cent of the students who participated in the survey accessed the Internet via their cellphones/smartphones and 21 per cent via their tablets.

In 2011, ADSL was the most used type of Internet access among students. The 2014 survey, however, indicated that respondents made use of 3G (54%) and cellphone devices (51%) more often, indicating a shift in the type of access used. In this regard, reference should be made to the following observation of Liebenberg, Chetty, and Prinsloo (2012, 12):

It is important to note that affordability might inhibit efforts to leverage the use of mobile technology for study purposes. While students might access the Internet via their mobile phones for personal activities and be willing to pay for this usage, they may be less likely to be able to afford to use mobile technology for study or learning activities.

The majority of the 2014 respondents indicated that they mainly accessed the Internet at home (76%) and at work (55%), as opposed to the respondents in the 2011 survey who indicated that they accessed the Internet at home (57%) and at work (51%). A notable increase in reliance on a mobile device for access to the Internet was evident, increasing from 11 per cent in 2011 to 26 per cent in 2014. According to the surveys' results, students used Internet cafés (9%), the Unisa Computer Library (7%) and the Unisa Multipurpose Community Centre (2%) to a much lesser extent in 2011 than in 2014.

Technological Capabilities

The researchers explored the ability of students to use software packages, platforms and web services by obtaining and evaluating students' self-reports (see Figure 3).

Please rate your ability to use the following computer software packages, platforms and web services.

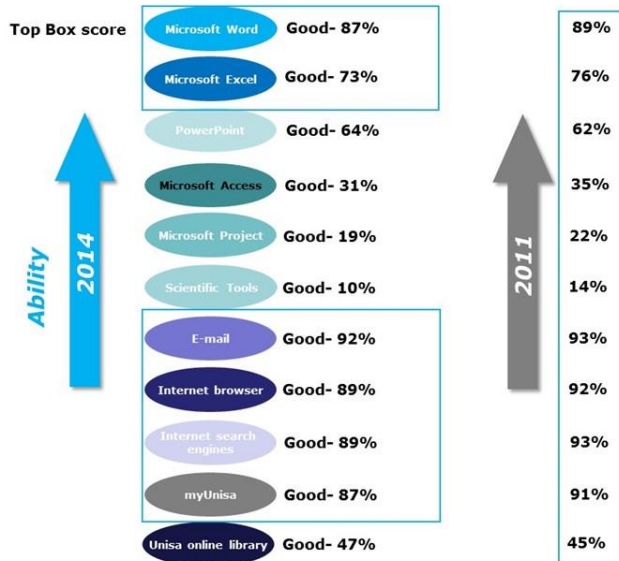


Figure 3: Ability to use software packages, platforms and web services

Students who participated in the 2014 survey were very comfortable with using email, Internet browsers and Internet search engine platforms. As expected, these students also indicated that they could navigate through the myUnisa site very well. Consistent with the 2011 findings, the 2014 survey indicated low ratings on the use of the Unisa online library, showing students struggle to use this very important resource.

The 2014 survey included additional items and measures to explore the ability of students to use software packages, platforms and web services. Data was obtained from students' self-reports and then evaluated (see Figure 4).

Please rate your ability to use the following computer software packages, platforms and web services.

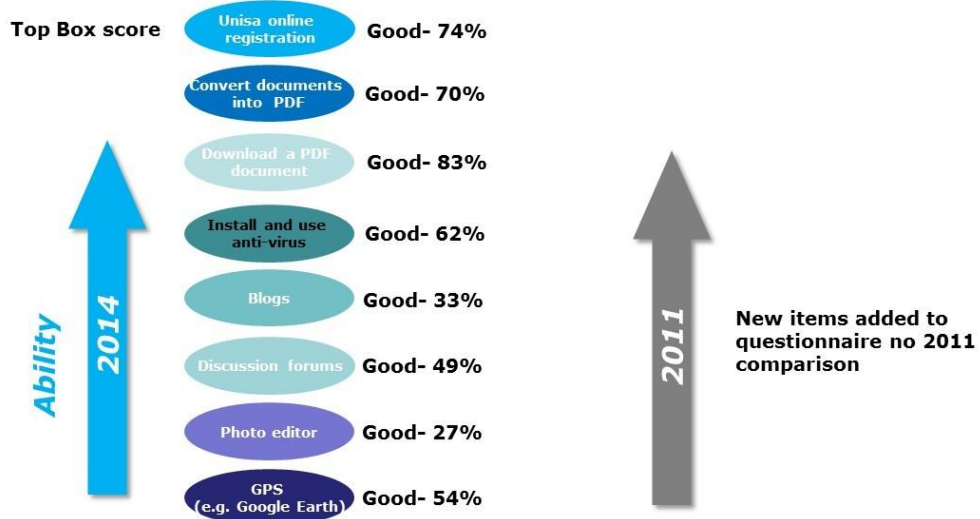
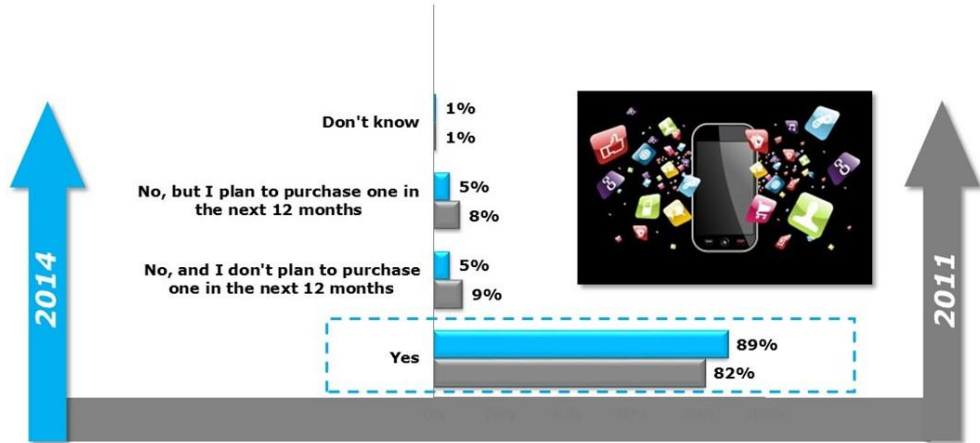


Figure 4: New items added to 2014 questionnaire (thus no comparison with 2011 data)

As illustrated in Figure 4, students participating in the 2014 survey were less comfortable using photo editors, blogs and discussion forums compared to the other packages, platforms and web services listed. These students were not as proficient in installing and using anti-virus programmes (62%) as they were in downloading PDF documents (83%). They scored themselves high (74%) in terms of their ability to register online with Unisa.

In Figure 5, personal ownership of mobile devices is illustrated.

Do you personally own a mobile device that is capable of accessing the internet?



89% of online respondents do own a mobile device that is capable of accessing the internet.

Figure 5: Access to mobile device with Internet capabilities

The vast majority (89%) of the 2014 respondents owned a mobile device that had the capacity to access the Internet. By comparison, 82 per cent of respondents in 2011 indicated that they owned a mobile device capable of accessing the Internet (see Figure 5). This provides evidence of a growth in the number of students using mobile connectivity.

In 2014, 62 per cent of the survey respondents indicated that they made use of their mobile phones to access the Internet either daily (53%) or weekly (9%). The proportion of students that accessed the Internet via their mobile devices had increased significantly from 2011 (41%) to 2014 (53%).

Figure 6 displays the students' self-rating of their ability to use specific applications on a mobile device.

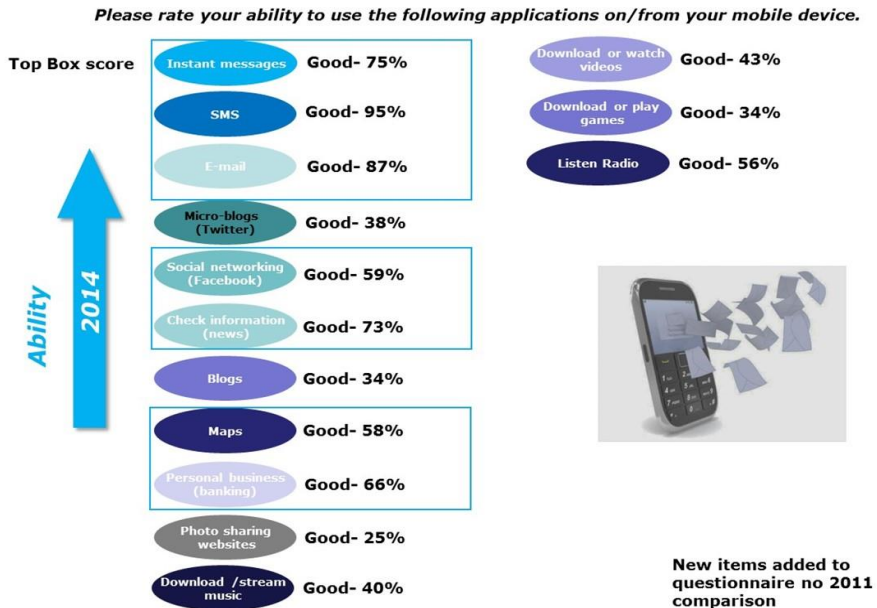


Figure 6: Ability to use (behaviour) a mobile device for Internet access

There is a developing network of mobile apps that is fueling the fast growth of the mobile Internet, providing students with fast access to platforms and information they may deem important for learning. Sending or receiving SMSs is the most popular among respondents (95%), followed by email (87%) and instant messaging (75%) (see Figure 6).

The data in Figure 7 represents students' experiences of navigating through websites. The data is reflective of the 2014 survey results only.

Figure 7: Navigation via websites

Students' ability to navigate websites is one aspect that can be evaluated to determine their proficiency in using ICT. Fortunately, as indicated in Figure 7, 92 per cent of the students who participated in the 2014 survey did not struggle to navigate through websites. Furthermore, 94 per cent of students made use of passwords to protect personal information.

Towards Measures of ICT Sophistication

As the analysis progressed, it became more important to consider students' access and ability to use ICT as dimensional measures of ICT sophistication with the aim of providing a basic segmentation model that could be used to moderate the following:

- Improve understanding of students' ICT behaviour
- Identify intervention opportunities
- Direct the allocation of resources
- Improve students' success through focused efforts in an ODL environment

As has been said earlier, access to ICT constitutes only one dimension of a more complex and elaborate construct, namely that of ICT sophistication. This construct directly concerns students' level of ICT use, engagement and experiences. In addressing ICT sophistication,

the aim is to improve students' success and throughput. In 2011, Unisa developed an initial model of ICT sophistication, and the 2014 research team revisited this model with the aim of developing their own conceptual model and refining it to take the rapid development of ICT over the years into account (see Figure 8).

The 2014 analysis process involved, amongst other things, the development of index variables to measure key constructs. ICT sophistication can be generally conceptualised as the relative extent of adoption of and engagement in ICT products and resources by students. A multi-step approach was followed in the construction of the sophistication model, namely: (1) selection of items and definitions of variables that were most associated from a face and construct validity perspective with being indicators of ICT sophistication (both access to and ability to use); (2) combination of variables into various indices; and (3) model development. Lastly, the ICT sophistication indices and various descriptor variables, including attitudinal dimensions, formed the basis for segmenting students and describing them according to a number of homogeneous groups.

In the conceptual model based on the results of the 2011 study, ICT sophistication was explained through two main axes, namely, levels of ICT access/adoption (X-axis) and extent of ICT engagement and usage (Y-axis). Based on the data obtained in the 2014 survey, this model was reviewed and refined with a view to gaining a better understanding of students' ICT behaviour and establishing a platform that could assist in intervention planning as well as predicting student success (see Figure 8).

Conceptual: ICT Sophistication

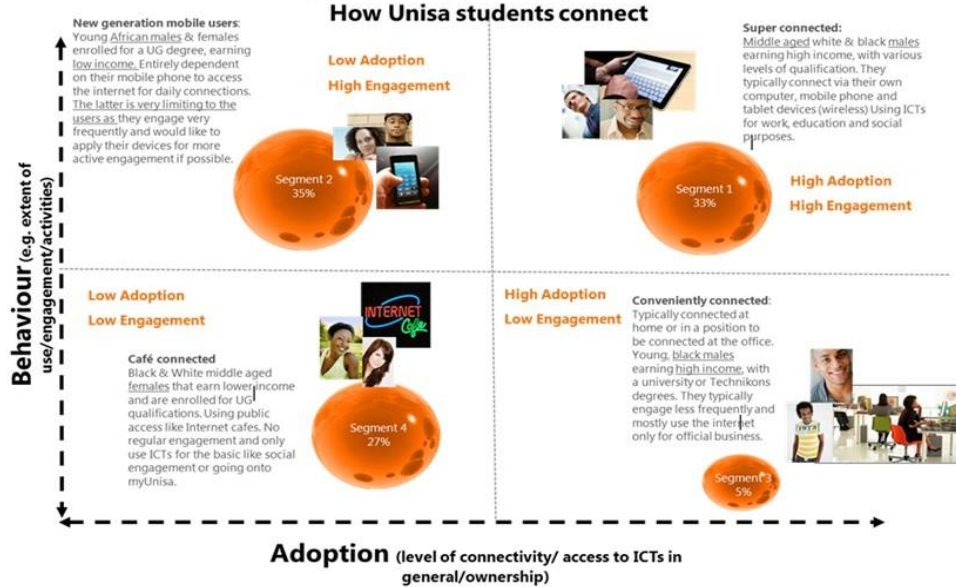


Figure 8: Conceptual framework of ICT sophistication, 2014

As illustrated in Figure 9, the analysis of the 2014 survey data indicated that users fell into four distinct segments based firstly on their level of ICT adoption and connectivity, and secondly on their ability to engage in these technologies.

Sophistication Analysis

Figure 9: ICT Sophistication model: Demographics

The various segments of students are profiled below.

Segment 1: Technically in Need (Low Ability and Low Access)

This segment is the least connected and has the lowest ability in using ICT. These students have been found to be predominantly African (65%), between the ages 40 and 49 and from lower socio-economic groups. An almost equal split of females and males is evident.

Segment 2: Access Cowboys (Low Ability and High Access)

This segment has access to and has adopted various ICTs but lack the ability to use the technologies fully. Segment members are slightly more likely to be males (55%) and are between the ages of 40 and 49. This group shows a very even split between African and white students and these students generally fall in a higher socio-economic group.

Segment 3: Conveniently Connected (High Ability and Low Access)

This segment is well-connected and very comfortable using ICTs. Group members are mostly African (49%), more likely to be female (60%), between the ages of 20 and 29 and 30 and 39, and from lower socio-economic groups.

Segment 4: Super Connected (High Ability and High Access)

The super users typically connect via their own computers or mobile devices and are quite at ease in using ICTs. A slightly higher percentage of white students (53%) fall into this group; group members are between the ages 20 and 29 and 30 and 39, and fall in higher socio-economic groupings. The majority of students from this segment speak English (51%) at home. An equal split of males and females is evident.

Lanerolle (2013, 14) declares that,

the community of Internet users has changed over the last five years. Most users now are black, almost half are women, two out of 10 users live below the official poverty line, and four out of 10 are on incomes below R1 500 per month.

In reviewing the Unisa 2011 and 2014 data, there are clear comparisons that can be drawn between the studies. Although students with a higher socio-economic status are more likely to use the Internet, a significant number of those in low-income groups are also now Internet users. Socio-economic status is therefore becoming less of a discriminating factor when it comes to Internet access. This notion receives general recognition in that many government development initiatives promote access to such technologies across the spectrum of the general public, irrespective of socio-economic status.

Most of our users of technology at Unisa are female, which is in keeping with the fact that the majority of Unisa students are female. As expected, the younger the students, the more likely they are to use the Internet and be comfortable with new and innovative technology (i.e. display exploratory ICT behaviours). Most students that use the Internet speak an African language or English. According to Lanerolle (2013, 10) “the greatest barrier to Internet use is literacy in English. This is more important than income, age, home language or occupation.”

Based on the data obtained, the students were placed in segments in terms of the ways they connected (see Figure 10).

How Students Connect

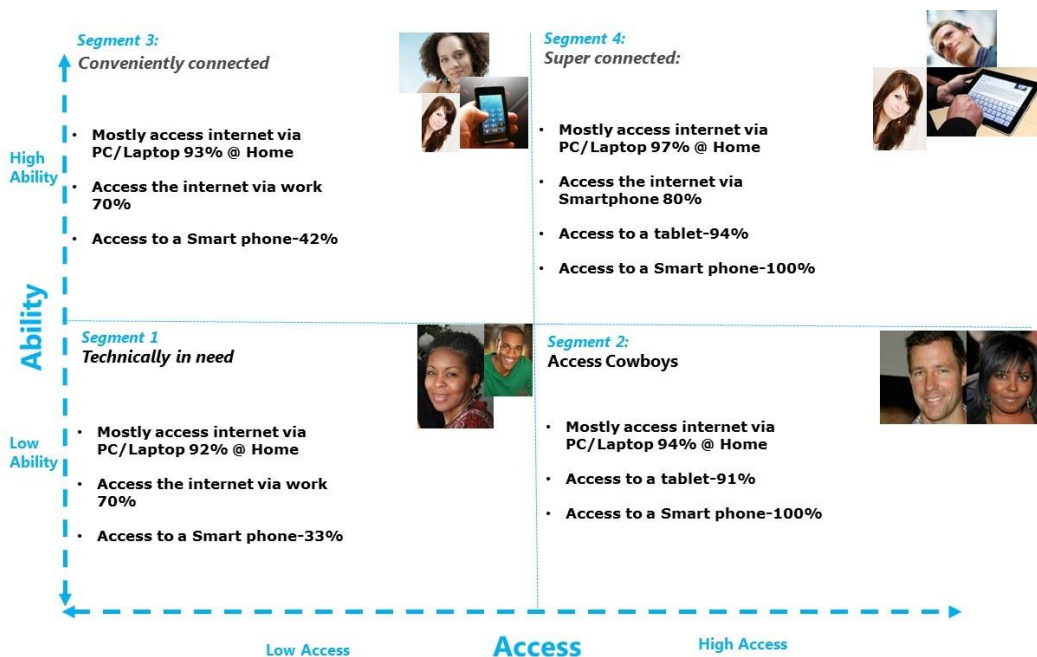


Figure 10: ICT sophistication model: How Unisa students connect

The different segments are described below.

Segment 1: Technically in Need (Low Ability and Low Access)

This segment is the least connected and has the lowest ability in using ICT. This group gets access to the Internet from home (92%) or from the office at work (70%). However, adoption of ICT, such as smartphones (33%), is still low.

Segment 2: Access Cowboys (Low Ability and High Access)

This segment has access to various ICTs but lacks ability to use them fully. This segment clearly has access to various technologies, with high adoption of even the very sophisticated tablet (91%) and smartphone (100%) ICTs. A slightly higher number of students have Internet access from home (94%) than those in segment 1.

Segment 3: Conveniently Connected (High Ability and Low Access)

This segment typically connects from home (93%) either by means of a laptop or desktop computer. Apart from having a home connection they have jobs that give them access at work (70%). The ICT usage of this segment is not as advanced as that of segment 4 as only

42 per cent of students have access to a smartphone and they generally do not use it for access purposes.

Segment 4: Super Connected (High Ability and High Access)

The typical super-connected users connect via their own computer or mobile device (e.g. tablet or smartphone) and they have high connectivity and high ability. According to the results, all of the students in this segment are most likely to have access to a smartphone and 94 per cent to a tablet. Eight out of 10 (80%) of these super users use their smartphones to access the Internet. Of these users, 97 per cent access the Internet from home using their laptop or desktop computers. Clearly the level of sophistication of this group is high.

Based on the data obtained, the students were placed in segments in terms of their ability to use ICT (see Figure 11).

Students’ Ability to Use ICT

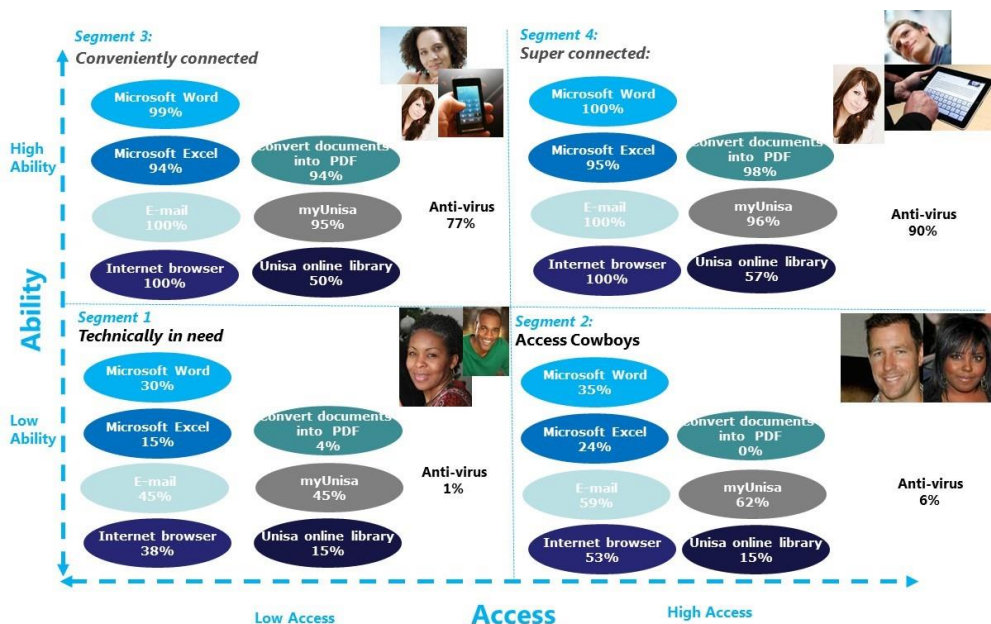


Figure 11: ICT sophistication model: Students’ ability

The different segments of students in terms of ICT ability are described below.

Segment 1: Technically in Need (Low Ability and Low Access)

This segment has the lowest ability in using ICT. Evident from the findings is that only one per cent of the students make use of anti-virus programs and only four per cent have a good ability to convert documents into PDF. As can be expected, nearly half of these students (45%) struggle to use the myUnisa site. Of concern is the low percentage of students using the Unisa online library (15%): they undoubtedly struggle to make use of this imperative resource. In comparison with students in the other segments, students in this segment are clearly less comfortable with Internet search engine platforms and email. The proportion of students that struggle to navigate through websites (40%) is higher than in the other segments, confirming their low ICT ability. Contrary to expectations, 84 per cent of students in this segment make use of passwords to protect their personal information. The Internet browser most used is Internet Explorer (54%). The students in this segment do not seem to explore the other alternative browsers that could be used, most probably as a result of their low ability.

Segment 2: Access Cowboys (Low Ability and High Access)

Although this segment has access to various new technologies, their low ability to use them successfully is evident from the results. These students struggle to make use of the myUnisa site, with only 62 per cent rating their ability as very good. In comparison to the higher performing segments, this percentage is much lower. They also scored themselves very low (15%) in terms of their capability to use the Unisa online library. Only six per cent make use of anti-virus programs, whereas none indicated they had a good ability to convert documents into PDF. The percentage of students in segment 2 that struggled to navigate through websites (27%) was much higher than the percentages in segments 3 and 4. Fortunately, 85 per cent of the students in this segment made use of passwords to protect their personal information. The Internet browser most used was Internet Explorer (47%), followed by Google Chrome (32%).

Segment 3: Conveniently Connected (High Ability and Low Access)

This segment proved to be quite comfortable in using Internet search engine platforms (100%) and email (100%). As expected, these students were more informed and able to use the myUnisa site (95%) very well. With regard to the Unisa online library, students (50%) showed a higher ability in using this resource; however, this was still an area of concern. Less than 80 per cent made use of anti-virus programs (77%), which was lower than some of the other segments. Of the students in this segment, 94 per cent displayed a good ability to convert documents into PDF. Clearly these students did not struggle to navigate through websites (4%), and 97 per cent used passwords to protect their personal information. The Internet browser most used was Internet Explorer (51%), followed by Google Chrome (29%).

Segment 4: Super Connected (High Ability and High Access)

The super-connected user made the maximum use of the extensive range of platforms and Internet services. Therefore, as expected, these students proved to be very comfortable using email (100%) and an Internet browser (100%) and converting documents into PDF (98%). Furthermore, 90 per cent of students in this segment made use of anti-virus programs. Even among this highly sophisticated group, only 57 per cent indicated that they had a good ability to use the Unisa online library; therefore this seemed to be a general problem among all students. It should be taken into account that the use of the online library is informed in part by the requirements of the subject matter the students are researching. Clearly these students do not struggle to navigate through websites (1%), and 98 per cent use password protection for their personal information. The Internet browser most used was Internet Explorer (40%), followed by Google Chrome (37%). It was evident that the more sophisticated students tended to move away from using the default browser; they started using new browsers that were different from the mainstream ones.

Conclusion

Oliver and Goerke (2007, 182) have found that “very high proportions of students have access via their own mobile phone and regular access via either a laptop or desktop computer.” Very similar results were found amongst the Unisa student body, with the findings of the 2011 and 2014 ICT surveys indicating that large proportions of our students have regular access to various ICTs, more specifically so to mobile devices. However, the research also found that having access did not necessarily suggest ownership. Therefore the broader challenge remains to ensure quality and stable access across all socio-economic levels and geographic areas of South Africa, and this is difficult.

The fact that there is a growth in ICT access and adoption amongst Unisa students is evident when comparing the 2011 and 2014 data. Access to computers at home has increased from 61 per cent to 82 per cent. Since 2011, the percentage of students who have access to the Internet for study purposes has increased from 91 per cent to 99 per cent. Clearly, a more sophisticated understanding of our students’ experiences of technology is needed.

Higher education institutions need to have an overarching communications and information strategy in place. As Seymour and Fourie (2010) point out, the use of the web continues to grow at an accelerated pace and so is the development of highly efficient search engines and social networking tools. Added to that, university students are increasingly making use of ICT for their personal purposes.

This view is corroborated when comparing the data from the 2011 survey to that of the more recent 2014 survey data. Universities need to seek methods of developing students’ ICT skills and knowledge in an effort to prepare them for their journey as students in an ODL environment, but also to prepare them for employment.

Furthermore, the findings of the research highlight that gender and age differences play a role when it comes to the use of ICT resources. These findings are important as the information can assist academics in their decisions about the effective use of information and communications technology in their specific higher education environments.

Within the Unisa context, ICT might need to develop more student interface systems on mobile platforms as students are becoming more proficient in using this kind of technology. Lack of knowledge is one of the most important reasons why students do not access the Internet on a more frequent basis. The more students discover the Internet the more self-assured they will be when using it in future.

Potential interventions in aiding students to develop their skills and confidence levels could, for example, be to integrate ICT skills into institutions' curriculums or to require students to obtain basic ICT certification when enrolling as a student.

The 2014 research study offered valuable insights for educational practitioners and it addressed elements of an ever-changing educational environment. Its data and findings provided information that would make it possible to develop intervention strategies.

The aim of the current study to investigate the construct of ICT sophistication as a measure that could assist in profiling Unisa's student population was achieved. Based on that, a model was developed using various variables that could give more insight into ICT sophistication levels among students than a model consisting of a single variable. The second aim of the research was also achieved, namely, to determine where the model could serve as a potential indicator or explanatory variable of student success and where it could be used to identify segments requiring ICT intervention and e-learning development, allowing the university to engage in intervention programmes in the early phases of students' study programmes. Such a model could further the institution's understanding of student behaviour and learning as a descriptor (profiling and moderating), predictor and mediator of learning.

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