

ICT ACCESS, USE AND PERCEPTIONS: THE CURRENT STATE OF PLAY AMONG STAFF AND STUDENTS AT SOUTH AFRICAN UNIVERSITIES OF TECHNOLOGY

P.K. RAMDEYAL
Mangosuthu University of Technology

Abstract

This paper reports on a mixed methods study that investigated access to, use, and perceptions of current and emerging technologies among Information Technology (IT) staff and students at universities of technology (UoTs) in South Africa. Fifty-eight IT staff and 410 IT students from 4 UoTs participated in the study. The primary research instrument was an online survey questionnaire, which was supplemented by semi-structured interviews with 31 of the study participants. Web investigations and conversations with IT support staff from UoTs also formed part of the mixed methods employed in the study. The findings of the online survey are analysed both from individual institutional perspectives and in aggregate form representative of the sector as a whole. Cross tabulations are used to analyse the data across institutions. The quantitative analysis reveals interesting trends and patterns in how students and staff are taking advantage of the potential held by Information and Communication Technologies (ICTs) for teaching and learning and for use in their daily lives. The qualitative findings question the assumptions that have been made about a digital divide between digital native students and their digital immigrant lecturers, suggesting that we need to develop a more sophisticated understanding of the role that technologies play in the lives of both students and staff. Results indicate that while students are very enthusiastic about using various ICTs and Web 2.0 tools, most have still to be convinced about their use for formal academic functions. Academic staff, on the other hand, continues to be cautiously optimistic about the use of ICTs in teaching and still harbour a number of concerns.

Keywords: ICT access, ICT use, Web 2.0 tools, use surveys, mixed methods

1. INTRODUCTION

In the ground-breaking report entitled “ICTs and the South African Higher Education Landscape” (Czerniewicz et al., 2006), the authors review the state of play with regards to the conceptualization and utilization of Information and Communication Technologies (ICTs) in South African higher education. The report notes that ICTs in higher education is a new and developing domain of enquiry and that no unanimity in the conceptualization, visualization or utilization of ICTs at institutional level existed at the time of writing. The report concludes that many crucial aspects have still to be defined, and many important details of ICT access and use are still to be filled in.

Given the many unknowns about the use of ICTs in higher education in South Africa, there is a lack of certainty regarding the future of e-learning and how university staff can plan for its effective implementation in their institutions (Linckels et al., 2009). Clearly, a study to examine the current state and future trends of ICTs in universities of technology (UoTs) is warranted. This pilot research study is a contribution towards that end.

This paper reports on a mixed methods study that investigated access to, use, and perceptions of current and emerging technologies among Information Technology (IT) staff and students at UoTs in South Africa. Overall results indicate that while students are very enthusiastic about using various ICTs and Web 2.0 tools, most have still to be convinced about their use for formal academic functions. Academic staff, on the other hand, continues to be cautiously optimistic about the use of ICTs in teaching and still harbour a number of concerns.

2. BACKGROUND

ICTs have been known to improve every aspect of university life, from registration to office administration, from teaching and learning to assessment, and from communication to research collaboration. However, there is a paucity of research regarding ICT access and use in higher education in South Africa (Czerniewicz and Brown, 2005). While there have been studies focused on e-learning initiatives in South Africa, most of the research seems to take the form of local case studies rather than meso- or macro-level investigations (Czerniewicz et al., 2006).

A significant large-scale study into ICT access and use in six South African universities in five provinces was undertaken in 2007 by researchers at the Centre for Educational Technology (CET) based at the University of Cape Town (Brown and Czerniewicz, 2008). The study formed the second phase of a research project begun in 2004 in five different South African universities. The original study showed that the use of computers for teaching and learning, whilst pervasive, was still quite narrow. Students used computers for learning more than staff did, and even when not required to. The study identified information searches as the most dominant student activity, while there was a low use of social networking technologies (Brown and Czerniewicz, 2008).

Many national and international studies have been undertaken investigating the barriers to adopting ICTs for teaching and learning in the classroom. One such recent study identified the unavailability of hardware resources, the lack of e-materials, increased preparation time and a lack of training as the major barriers to academic staff implementing ICTs in their teaching functions (Glen and Isaacs, 2007). Moreover, slow Internet bandwidth severely constrains the use of Web 2.0 tools (Gakio, 2006).

Most research into the use of Web 2.0 tools and e-learning technologies at UoTs has been undertaken at the institutional and discipline-specific level and no comprehensive survey of ICT access and use has been undertaken to date. This makes local benchmarking an almost impossible task. Moreover, the large number of available technologies and the rapid speed at which these are updated and/or replaced poses further challenges for researchers from a reporting point of view. Although some of the findings of this local research align with current international trends, most of the results align with earlier international studies. This is a clear indication that UoTs in South Africa are still in the early stages of adopting ICTs for teaching and learning.

3. RESEARCH QUESTIONS

The primary research question the study sought to answer was, “how are UoT staff and students engaging with ICTs both in their personal lives and for academic purposes?” In particular, the following practical secondary questions were identified:

- What ICTs do staff and students have access to?
- For what, and how often, do students and staff use these ICTs?
- What factors impede and accelerate the adoption of ICTs for academic activity?
- What are the perceptions of students and staff about the usefulness of various Web 2.0 tools for academic activity?
- What are the current trends and usage patterns of student and staff engagement with ICTs, and are there any differences between student use and staff use?

4. RESEARCH INSTRUMENTS

4.1. Survey questionnaire

The primary research instrument in this study was a survey questionnaire. Separate questionnaires, with minor differences, were developed for students and staff. The study commenced with a preliminary investigation consisting of a literature review and unstructured interviews with a group of potential study participants. The themes that emerged from these conversations led to a set of core ICT indicators which informed the development of the survey instrument. The indicators were further refined and regrouped in consultation with the staff and students who participated in the preliminary investigation.

As a result, the draft student questionnaire contained 53 data items and the staff questionnaire contained 59 items, grouped into the following broad categories:

- I. Demographic data
- II. Access to ICTs (computers, Internet, cell phones)
- III. Use and use frequency of ICTs (Internet use, cell phone use, Web 2.0 use)
- IV. Perception of ICT use in teaching and learning

Both questionnaires were available in English only.

4.2. Pilot testing

The draft questionnaires were piloted among ten students and five staff members selected randomly from the four institutions to identify any ambiguities, contradictions and difficulties in interpreting the questions. Feedback was received from the pilot study participants via e-mail and over the telephone. As a result, three questions were excluded from the questionnaire, one because of overlap of content and the other two because of their loose connection to the aims of the study. In addition, four questions were re-worded (to the satisfaction of the pilot study participants) to eliminate ambiguity. The questionnaires were then translated into an online version and tested from various operating systems, browsers and devices.

5. METHOD

5.1. Research design

It became apparent in the early stages of this study that the adoption of a mixed methods research design was best suited to achieving the research aims of the study. Mixed methods research is defined as the class of research where the researcher combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study (Johnson and Onwuegbuzie, 2004), and its basic premise is that the combination is more effective in addressing research problems than either approach by itself (Creswell and Garret, 2008). This study utilized a mixed methods approach consisting of a four-stage sequential design (Creswell and Plano Clark, 2007) with embedded cyclic components, which are explained as follows. (i) Preliminary investigation: an investigation into previous similar research was undertaken to identify the various important aspects relating to ICT access and use. Unstructured interviews with six staff members and a group of eight students at a developing UoT were carried out to establish the nature and types of student and staff interaction with ICTs. (ii) Development of research instruments: the themes that emerged from the first stage were used as a guide to develop the primary research instrument, the survey questionnaires. The questionnaires were subjected to pilot testing by five staff members and ten students from the institutions under study. (iii) Data collection:

After adjustments were made to the questionnaires and all technical difficulties were resolved, they were hosted online on the website of a commercial survey service provider and remained active for a period of two weeks. The administration of the questionnaires was carried out with the assistance of a staff member in each of the institutions under study. (iv) Data analysis and report writing: The data gathered from the quantitative study were analysed using the SPSS application software. Various statistical techniques were utilized and semi-structured interviews (mainly telephonic) with 31 of the study participants served to aid the interpretation of the results and the drafting of the report.

5.2. Participants

The study participants were drawn from IT departments at four UoTs in South Africa. The decision to restrict the target group to IT students and staff was motivated by the basic assumption that those who work most closely with ICTs are more likely to be using the most up-to-date technologies, which will place them in the upper end of the spectrum of early adopters of technologies for teaching and learning. Stated differently, if there existed a continuum indicating progress with respect to implementation of ICTs, scaled from least to most, it is most likely that IT students and staff will be located somewhere on the upper end of the continuum.

5.3. Data collection procedures

Staff in the IT departments at the four UoTs were enlisted to administer the survey to their students – typically, students were allocated time in the lab during practical sessions to complete the survey. Staff members were e-mailed the URL to the survey questionnaire and were requested to participate in the research. A covering letter which explained the purpose and nature of the research project, emphasised the voluntary nature of the staff member's participation, and provided assurance of anonymous participation and the confidentiality of all data collected, was attached to the e-mail.

As part of the online survey, respondents were asked to volunteer to participate in a follow-up interview to clarify issues which emerged from the analysis of the survey responses. In this case, the participant was required to provide his/her e-mail address, and was assured that participants' personal details would be stored separately from their survey responses.

6. ANALYSIS OF FINDINGS AND DISCUSSION

6.1. Data analysis techniques

The quantitative data collected through the survey instruments were analysed using the SPSS application software.

Frequencies and descriptive statistics were derived from the captured data and the results were examined. Cumulative percentages produced during the analysis aided in interpreting the results according to groups or clusters. Cross tabulations were used to categorize responses on the basis of more than one variable at a time.

The sub-scales used in the survey instrument were subjected to detailed item analysis to identify possible items that were not contributing to an internally consistent description of the variables being measured. Cronbach's coefficient alpha was computed to determine the reliability of all the sub-scales used in the survey instrument. Cronbach's alpha ranged from 0.7 to 0.9 for all sub-scales used in the analysis, indicating an "acceptable to good" internal consistency of the scale items (George and Mallery, 2003).

Both the unstructured interviews at the commencement of the study and the semi-structured interviews at the conclusion of the study were recorded using a Livescribe Pulse Smartpen. Subsequent qualitative analysis of the audio and textual data gathered during these phases of the research process was carried out, and the results and interpretation thereof have been incorporated in the sections that follow. In some instances, respondents were contacted a second time to clarify certain aspects that arose during the first round of telephonic interviews.

6.2. Profile of respondents

Fifty-eight IT staff and 418 IT students responded to the call to complete the online survey. Eight completed student surveys were excluded from the data analysis as they contained unreliable data – three were substantially incomplete while five contained contradictory data; for example, students indicated that they had access to ADSL Internet while simultaneously indicating that they did not have a landline telephone.

The male-to-female ratio in the national student sample was 3:2. All student respondents were registered for the National Diploma in Information Technology. Table 1 illustrates the demographic profile of the student respondents, while Table 2 provides the corresponding information for the staff respondents.

Table 1: Demographic profile of student respondents.

| | | | Gender | | Year of Study | | | Total |
|-------------|----------------------|----------------------|--------|-------|---------------|-------|--------|--------|
| | | | Female | Male | 1 | 2 | 3 | |
| Institution | A | Count | 36 | 57 | 48 | 8 | 37 | 93 |
| | | % within Institution | 38.7% | 61.3% | 51.6% | 8.6% | 39.8% | 100.0% |
| | B | Count | 37 | 67 | 26 | 9 | 69 | 104 |
| | | % within Institution | 35.6% | 64.4% | 25.0% | 8.7% | 66.3% | 100.0% |
| | C | Count | 38 | 58 | 8 | 10 | 78 | 96 |
| | | % within Institution | 39.6% | 60.4% | 8.3% | 10.4% | 81.3% | 100.0% |
| | D | Count | 55 | 62 | 50 | 17 | 50 | 117 |
| | | % within Institution | 47.0% | 53.0% | 42.7% | 14.5% | 42.7% | 100.0% |
| Total | Count | 166 | 244 | 132 | 44 | 234 | 410 | |
| | % within Institution | 40.5% | 59.5% | 32.2% | 10.7% | 57.1% | 100.0% | |

The staff sample contained an even number of males and females and was representative of the spread of senior staff (Head of Department (HOD)/Professor) and junior staff in typical academic departments.

Table 2: Demographic profile of staff respondents

| | | | Gender | | Position | | | | Total | |
|-------------|----------------------|----------------------|--------|-------|----------|-----------|-------|-----------|--------|-----------|
| | | | F | M | HOD/Prof | Snr. Lect | Lect | Jun. Lect | | Acad Supp |
| Institution | A | Count | 4 | 7 | 1 | 1 | 4 | 2 | 3 | 11 |
| | | % within Institution | 36.4% | 63.6% | 9.1% | 9.1% | 36.4% | 18.2% | 27.3% | 100.0% |
| | B | Count | 4 | 7 | 0 | 0 | 5 | 5 | 1 | 11 |
| | | % within Institution | 36.4% | 63.6% | 0.0% | 0.0% | 45.5% | 45.5% | 9.1% | 100.0% |
| | C | Count | 11 | 6 | 3 | 3 | 10 | 0 | 1 | 17 |
| | | % within Institution | 64.7% | 35.3% | 17.6% | 17.6% | 58.8% | 0.0% | 5.9% | 100.0% |
| | D | Count | 9 | 10 | 1 | 1 | 6 | 10 | 1 | 19 |
| | | % within Institution | 47.4% | 52.6% | 5.3% | 5.3% | 31.6% | 52.6% | 5.3% | 100.0% |
| Total | Count | 28 | 30 | 5 | 5 | 25 | 17 | 6 | 58 | |
| | % within Institution | 48.3% | 51.7% | 8.6% | 8.6% | 43.1% | 29.3% | 10.3% | 100.0% | |

6.3. Access to ICTs¹

Student access to ICTs at the four institutions is depicted in Figure 1. The majority of student respondents (79-85%) at each of the institutions indicated that they have access to a computer during the academic term. An area of grave concern is that, on average, 17% of IT students nationally do not have access to computers outside of their universities. It emerged during the post-survey interviews that at least two institutions make their facilities available to students after hours, while students from the other two institutions relied on the generosity of their family and friends. Interviews with staff indicated that they believe that the lack of access to computers after hours is a major contributing factor to the high failure rate, especially at first- and second-year levels.

Internet access rates (not counting access to the Internet via smart phones), on the other hand, are extremely low, ranging from 32% to 43%. This poses particular challenges with respect to students accessing learning management systems (LMSs) (e.g. BlackBoard Learn) and other online learning resources from off campus. Although students pointed out that they could access learning materials through their smart phones, staff indicated that none of the UoTs in this study have implemented the mobile-friendly version of their LMS. Consequently, because viewing an LMS which is not enabled for mobile-device access in a browser on a smart phone makes only a limited set of features available, only a subset of the functions of the LMS is available to students off campus.

All student respondents reported that they owned cell phones. Smart phone ownership among the IT student population is extremely high, ranging from 70% (Institution B) to 79% (Institution C). On the other hand, landline access is extremely low, implying that most of the students live in areas of very low telephone penetration.

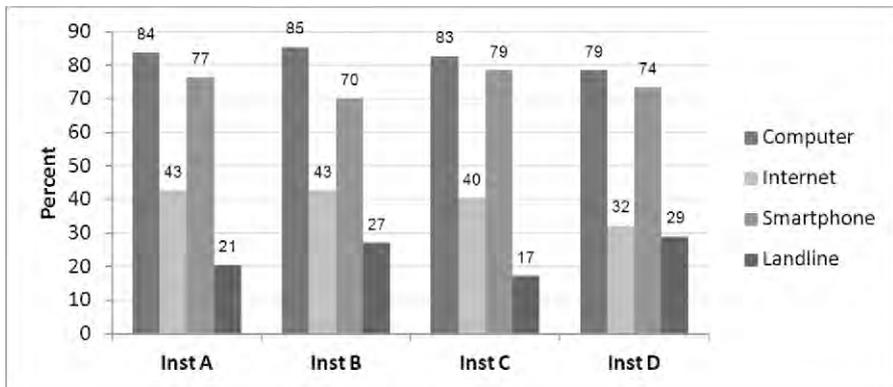


Figure 1: Student access to ICTs by institution

¹Space considerations limit the reporting of all data items collected through the survey instrument. Only a subset of the data collected in the study pertaining to the research questions articulated in section 3 is reported upon in this paper.

All staff respondents indicated that they had access to computers and the Internet at work. 55% of staff indicated that they had access to both wireless and wired connections at work, while the remainder (45%) indicated that they could access the Internet at work only through a cable connection. This indicates that most institutions have not completed the implementation of a totally wireless campus network. Moreover, 86% (n=50) of staff reported that they had access to a dedicated office phone. Access to office telephones becomes a necessity if institutions plan to implement Voice over Internet Protocol to reduce costs.

All staff indicated that they had access to computers at home. In an attempt to align the question on computer access to similar surveys in the developed world, respondents were asked to indicate how many computers they had access to at home (Jaffer et al., 2007). Interestingly, 33% indicated that they had one computer at home, 29% had two computers and the remainder (38%) reported that they had access to three or more computers at home. This is a clear indication of the importance staff place on ICT access for family members. The type of computers to which staff have access varies, but laptops dominate (54%), followed by desktops (33%). Very few staff members own a tablet PC (9%), while only 4% reported that they have access to a netbook computer. Staff access to the Internet at home varied among the staff at the various institutions. Only one institution (A) reported a very low access rate (47%). Staff access to ICTs is illustrated in Figure 2.

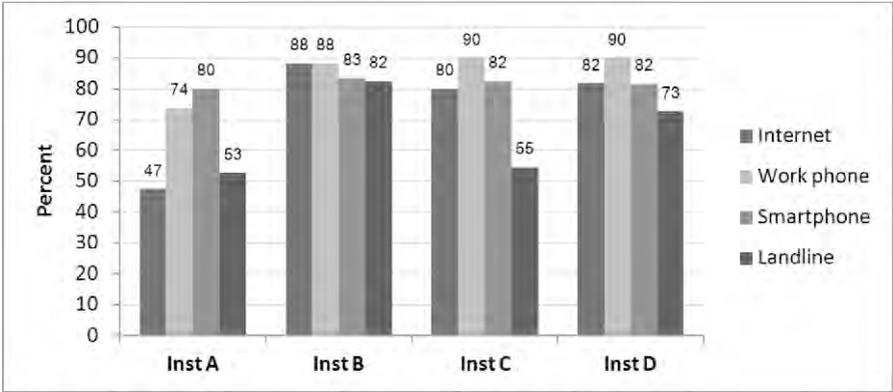


Figure 2: Staff access to ICTs by institution

The ownership of smart phones among staff exceeds 80% in all institutions surveyed. Staff access to telephone lines at home is low at two of the institutions (A and C). South Africa has a very uneven distribution of telephone penetration, which is dense in highly urbanised areas. Staff ownership of other mobile devices such as PDAs, eReaders, iPods and hand-held video recorders were all below 10%.

6.4. Use of ICTs

6.4.1. Cell phone use

Respondents were required to select from a list of five non-Internet related items and a list of seven Internet-related items to indicate how they used their cell phones. The results of the data analysis are presented in Table 3.

Table 3: Cell phone use frequency by respondent groups

| | Staff | | Students | |
|------------------------------|-----------|---------|-----------|---------|
| | Frequency | Percent | Frequency | Percent |
| Recording audio/lectures | 21 | 36.2% | 62 | 15.1% |
| Taking pictures and videos | 50 | 86.2% | 322 | 78.5% |
| Listening to music | 26 | 44.8% | 349 | 85.1% |
| Playing games | 15 | 25.9% | 235 | 57.3% |
| Appointments and reminders | 43 | 74.1% | 46 | 11.2% |
| Web surfing | 34 | 58.6% | 226 | 55.1% |
| Academic information search | 31 | 53.4% | 327 | 79.8% |
| Social networking | 39 | 67.2% | 317 | 77.3% |
| Watching videos | 14 | 24.1% | 150 | 36.6% |
| Podcasts | 2 | 3.4% | 54 | 13.2% |
| eBooks | 11 | 19.0% | 113 | 27.6% |
| Downloading lecture material | -- | -- | 142 | 34.6% |

The five most dominant activities for which students use their cell phones are: (i) Listening to music, (ii) Academic information search, (iii) Taking photographs and recording videos, (iv) Social networking, and (v) Web surfing. A completely different picture emerges with respect to staff use of cell phones: (i) Taking photographs and recording videos, (ii) Recording appointments and reminders, (iii) Social networking, (iv) Web surfing, and (v) Academic information searches. An interesting observation is that students are using their cell phones for academic activity (position 2 in above list). This is aligned with the findings of the CET study (Brown and Czerniewicz, 2008). During the interviews, it emerged that students rely excessively on searching the web for information. Students were adamant that the most common search they performed was for “meanings of words”. Students also admitted that it is common for them to IM their peers for academic information, sometimes while they are in class.

These examples of how students are using ICTs to navigate through academic life are important lessons for academic staff who are interested in using these technologies in the classroom or to supplement what has been covered in the classroom.

Table 4 presents a comparison of the frequency with which students and staff access the Internet and their e-mail accounts on their cell phones.

Table 4: Cell phone Internet and e-mail access

| | CP-Internet | | CP-email | |
|---------------------------|--------------|-----------|--------------|-----------|
| | Students (%) | Staff (%) | Students (%) | Staff (%) |
| Almost daily | 68.5 | 55.2 | 37.3 | 74.1 |
| 3-5 times a week | 15.9 | 17.2 | 24.9 | 0.0 |
| Less than 5 times a month | 6.8 | 17.2 | 15.4 | 6.9 |
| Never | 8.8 | 10.3 | 22.4 | 19.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

22% of students reported that they connected their cell phones to the campus wireless network, while 29% of staff indicated that they accessed the wireless network from their cell phones. An interesting result was that the majority of students (67%) indicated that they connected their computers to the wireless network. During the interviews, students indicated that they were forced to engage in this activity while sitting in corridors and park benches, and indicated that they would be grateful if the university administration could make facilities available for them to connect their devices to the network in a secure and enclosed environment. This is an interesting implication for academic staff, because the wireless network provides their students with opportunities to download lecture materials and other learning materials. However, the academic support staff who is responsible for the management of the campus network argue that it is precisely this practice of allowing students access to the wireless network that is slowing down the network and using up the available bandwidth. Here is the conundrum for academic staff: while they advocate for their students to have wireless access, they themselves become victims of the resultant slow network.

Students were asked to indicate their communication medium preference for departmental notices. Interestingly, the majority of students prefer SMS (43%), while only 22% prefer e-mail. About a third of the students (34%) indicated that they did not have a preference and that either medium is acceptable. During the interviews, students recommended that institutions increase their use of social networking sites to communicate with students.

6.4.2. Social networking

A staggering 66% (n=269) of student respondents use Facebook one or more times a day, and only 5% (n=20) do not use Facebook at all. During the interviews, students attributed this to the ease with which the social networking site is accessible via smart phones. The use frequency and period of use of Facebook is indicated in Table 5(a). A comparison of the number of friends (people to whom students generally talk face-to-face) and the number of Facebook friends students have appears in Table 5(b). Clearly, students are more suited to “making friends” online than they are in the personal face-to-face mode. However, this result must be viewed with caution, as the technology itself is mainly responsible for finding friends and making suggestions to users.

Table 5(a): Facebook use patterns

| Access Frequency | | | Use Period | | |
|---------------------------|-----------|---------|-----------------------|-----------|---------|
| | Frequency | Percent | | Frequency | Percent |
| One or more times a day | 269 | 65.6 | 1-3 years | 172 | 42.0 |
| 3-5 times a week | 93 | 22.0 | Less than 1 year | 71 | 17.3 |
| Less than 5 times a month | 28 | 6.8 | More than 3 years | 148 | 36.1 |
| I do not use Facebook | 20 | 4.9 | I do not use Facebook | 20 | 4.9 |
| Total | 410 | 100.0 | Total | 410 | 100.0 |

Table 5(b): Facebook friends comparison

| | Number of Friends | | Number of Facebook Friends | |
|--------|-------------------|---------|----------------------------|---------|
| | Frequency | Percent | Frequency | Percent |
| < 20 | 189 | 46.1 | 9 | 2.2 |
| 20-50 | 133 | 32.4 | 27 | 6.6 |
| 50-100 | 51 | 12.4 | 62 | 15.1 |
| > 100 | 37 | 9.0 | 287 | 70.0 |
| NA | -- | -- | 25 | 6.1 |
| Total | 410 | 100.0 | 410 | 100.0 |

Staff use of social networking sites is low, with 16% (n=15) of staff respondents indicating that they did not use Facebook at all. Moreover, Facebook use among staff was evenly distributed among the access frequency options provided. It became clear during the staff interviews that if social networking sites are to be incorporated into the classroom, the first challenge will be to get staff to buy into their usefulness. The interviews revealed that only a handful of staff truly believed that Facebook could be used for academic activity. The rest discounted the idea as being “ridiculous and not feasible”. Twitter use among students is surprisingly low, with 59% (n=243) of the student respondents indicating that they did not make use of Twitter. Twitter is also not very popular among staff, with 57% indicating that they do not use the site.

6.4.3. Instant messaging (IM)

Respondents were requested to indicate which instant messaging (IM) applications they used on their cell phones. The use patterns are depicted in Figure 3. IM holds immense potential both for communication between groups and for academic applications where collaboration is required. However, the usage patterns which emerge from this analysis pose interesting challenges if these technologies are to be used for academic purposes. Mxit and WhatsApp are the two most popular IM applications used by students, while staff rarely reported using these. Interestingly, the dominant IM application among staff is Blackberry Messenger (used by more than half of the respondent group). This is most probably attributable to the technology (cell phone type) possessed by staff rather than personal choice. These contrasting IM usage patterns among staff and students indicate that a shift in the use of these applications by the different respondent groups needs to be made if the potential of IM in academic activity is to be realised. An interesting observation to be made from the figure below is that the two applications which seem to hold the most potential for academic use (viz., Windows Live Messenger and Google Talk) because they can be accessed from any Internet-ready device (cell phone, laptop, tablet PC) are the ones least used by both students and staff.

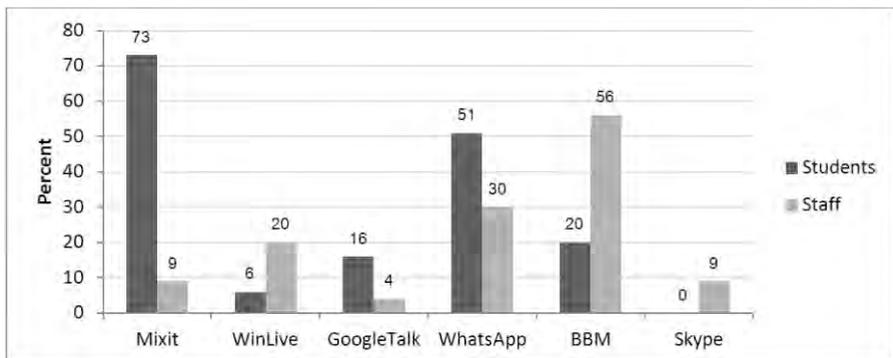


Figure 3: Student and staff use of cell phone IM applications

6.4.4. Internet use

Respondents were asked to indicate what activities they engaged in when they connected their computers to the Internet. Figure 4 represents a comparison between the student and staff responses.

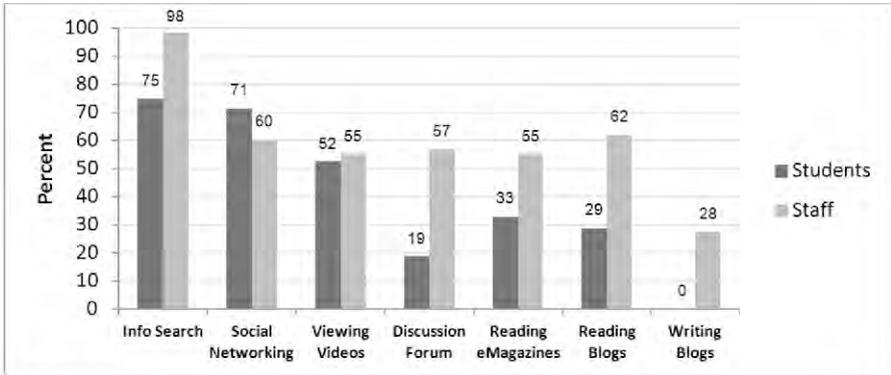


Figure 4: Student-staff comparison of Internet use

Interestingly, blogs and discussion forums, while gaining popularity internationally, seem to be the Web 2.0 tools least used by both students and staff. It was clear from the interviews that most staff resists the idea that these tools could be effectively used for teaching and learning. As far as they were concerned, students “just do not read”.

6.4.5. Web 2.0 tools for teaching

Staff were requested to select the tools that they currently used for academic activity from a predefined list of 12 (mainly Web 2.0) tools. Table 6 represents the frequency of their responses for each tool, listed in order of descending frequency.

Table 6: Staff use of Web 2.0 tools

| Tool | Frequency (%) |
|-----------------------------|---------------|
| PowerPoint (PPT) | 86 |
| Instructor resource website | 43 |
| Instructor resource CD | 42 |
| BlackBoard Learn | 40 |
| Video and audio | 22 |
| Facebook | 21 |
| Discussion forum | 20 |
| Blogs | 17 |
| Chat rooms | 17 |
| Twitter | 16 |
| Online groups | 9 |
| Moodle | 7 |

It is not surprising that PowerPoint tops this list. However, all Web 2.0 tools are used by less than 25% of staff. This represents a lost opportunity when it is viewed against the backdrop of how students are engaging with these tools.

6.5. Perceptions of ICTs

In an attempt to gauge the current perception of students with respect to making use of Web 2.0 tools in the teaching and learning processes, respondents were presented with five statements and were asked to indicate their agreement on a five-point Likert scale. Descriptive terms were used for the scale points as follows: (5) Strongly agree, (4) Agree, (3) Neutral, (2) Disagree, and (1) Strongly disagree.

The five statements were worded in a positive frame and are listed below:

- I. My learning experience will be better if my lecturers used Facebook and Twitter as a teaching tool;
- II. My learning experience will be better if my lecturers used blogs as a teaching tool;
- III. My learning experience will be better if my lecturers used video and audio recordings as a teaching tool;
- IV. My learning experience will be better if my lecturers used discussion forums and chat rooms as a teaching tool; and
- V. My learning experience will be better if my lecturers used PowerPoint presentations as a teaching tool.

Figure 5 depicts how students view the use of these tools in teaching and learning.

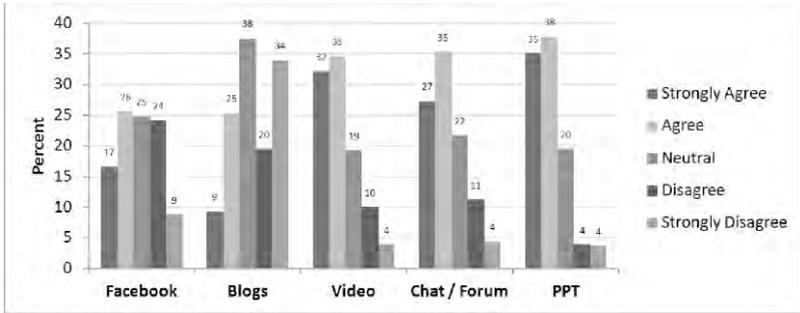


Figure 5: Student perceptions of Web 2.0 use in teaching and learning
Academic staff was requested to indicate their perceptions about these technologies on the same scale, but the statements were phrased differently, as follows:

- I. Social networking sites such as Facebook and Twitter can be used as a tool to enhance teaching and learning;
- II. Blogs can be used as an effective teaching and learning tool;
- III. Video and audio recordings can be used to enhance teaching and learning;
- IV. PowerPoint presentations can be used to improve the teaching and learning processes;
- V. Discussion forums and chat rooms can be used to improve teaching and learning.

Figure 6 represents the collective responses of staff respondents.

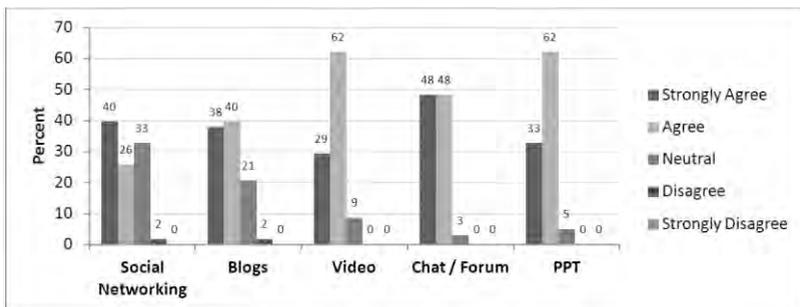


Figure 6: Staff perceptions of Web 2.0 use in teaching and learning

Interestingly, student respondents were cautious in their thinking about the use of these tools for teaching and learning, with the majority selecting the “neutral” to “agree” scale points. As a result, student responses for this aspect were all below 40% for each of the response options. During the interviews, students indicated that they were excited and impressed with these tools, but were not sure as to how they could be used for academic purposes. There was strong agreement among the participants, however, that students will naturally embrace these tools if they understand how the tools could assist them in the learning process. The majority of staff was equally unaware of how these tools could be incorporated into the teaching process, resulting in a somewhat reserved collective response. Interestingly, none of the staff disagreed as to the potential of using these tools in the teaching process. Staff who was interviewed were unanimous in their view that staff training and development were key to (and a prerequisite for) any successful implementation of these tools in the classroom.

6.6. Barriers

Staff was requested to indicate what, in their opinion, were the major stumbling blocks or barriers to them adopting ICTs in their teaching and learning. Their responses are captured in Figure 7.

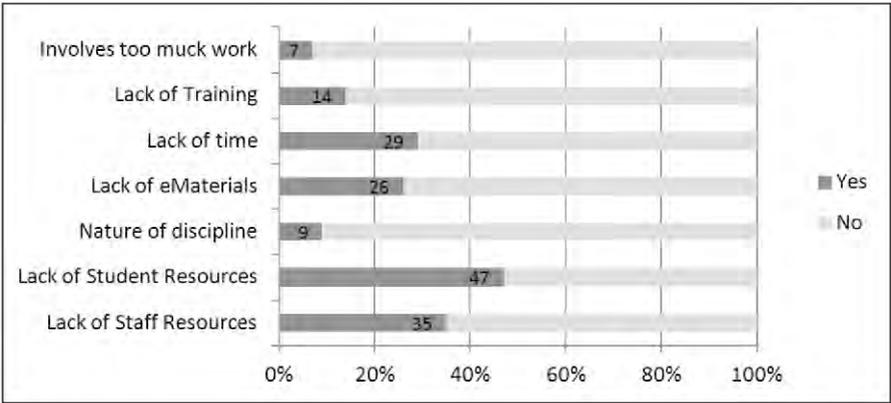


Figure 7: Barriers to ICT use in teaching and learning

For the most part, the responses are aligned to the situation in higher education institutions in most of the developing world. However, of concern is the staff impression that a lack of resources amongst students is the primary stumbling block to them incorporating ICTs in the classroom. This is an ill-informed opinion based mainly on incorrect information, as students are clearly making use of their mobile devices for various academic purposes, implying that staff is not necessarily in touch with the resources which students are currently using.

The nature of the discipline and lack of e-materials received a very low rating, indicating that the field as a whole has progressed rapidly from the time of the 2006 ICT survey (Gakio, 2006) and the 2007 study (Glen and Isaacs, 2007).

Staff was also asked to indicate what factors, in general, prevented the uptake of ICTs across their institution. Figure 8 depicts the collective responses of staff respondents.

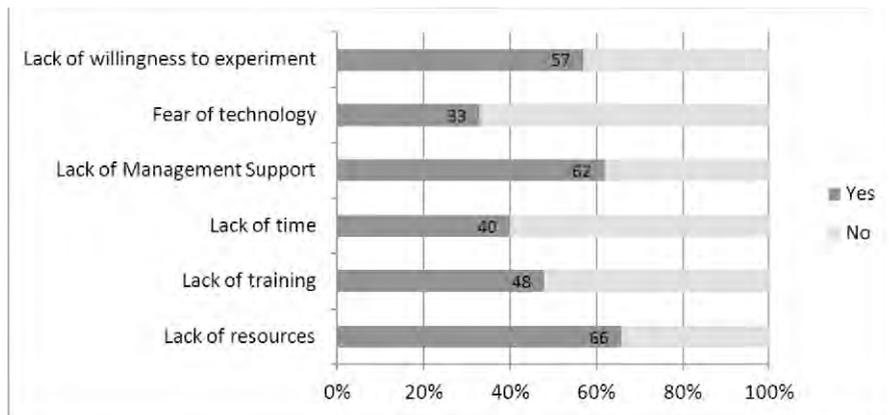


Figure 8: Barriers to ICT use in the institution

Clearly, a lack of staff resources continues to dominate the list of barriers. An interesting result was that the lack of management support emerged as the second most-cited limiting factor. During the interviews, staff expressed the opinion that in general, although management at their institutions supported the use of technology in the classroom, the actual investment in terms of the provision of resources and staff training was seriously inadequate. As an added complication, staff indicated that decision-making strategies with respect to the implementation of ICTs were driven for the most part by the technical departments in their institutions, with very little input from the IT academic staff. The rest of the limitations which emerged from this study are aligned to previous research on this aspect at higher education institutions (Czerniewicz et al., 2006; Czerniewicz and Brown, 2009).

6. CONCLUSION

This paper reported the results of a survey of ICT access, use and perceptions among IT staff and students based at UoTs. Various recommendations for academic staff and management at UoTs have been put forward in the discussion of the results. While the results of the study paint an encouraging picture for the use of ICTs at UoTs, it must be noted that the target group in this study were staff and students from IT departments. In this regard, further research aimed at the broader UoT population is suggested and urgently required.

For the most part, the adoption of ICTs at UoTs in South Africa is increasingly receiving the attention of both researchers and university management and is expected to follow an exponential growth path in the near future.

7. REFERENCES

Brown, C. & Czerniewicz, L. 2008. Trends in student use of ICTs in higher education in South Africa [Online]. Available: http://www.cet.uct.ac.za/files/file/ResearchOutput/2008_wwwApps_UseTrends.pdf [2010, February 10].

Creswell, J.W. & Garrett, A.L. 2008. The “movement” of mixed methods research and the role of educators. *South African Journal of Education*, 28: 321-333.

Creswell, J.W. & Plano Clark, V.L. 2007. *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.

Czerniewicz, L. & Brown, C. 2005. Access to ICT for teaching and learning: From single artefact to interrelated resources. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 1(2): 42-56.

Czerniewicz, L. & Brown, C. 2009. A study of the relationship between institutional policy, organisational culture and e-learning use in four South African universities. *Computers & Education* [Online] 53(1). Available: <http://www.science-direct.com.ez.sun.ac.za/science/article/pii/S0360131509000104> [2010, February 10].

Czerniewicz, L., Ravjee, N. & Mlitwa, N. 2006. Information and Communication Technologies (ICTs) and South African Higher Education: Mapping the Landscape [Online]. Available: http://www.che.ac.za/media_and_publications/higher-education-monitor/higher-education-monitor-5-icts-and-south-african [2010, February 10].

Gakio, K. 2006. African Tertiary Institutions Connectivity Survey (ATICS): 2006 Report [Online]. Available: http://ahero.uwc.ac.za/index.php?module=cshe&action=viewtitle&id=cshe_172 [2010, February 10].

George, D. & Mallery, P. 2003. *SPSS for Windows step by step: A simple guide and reference*. Boston: Allyn & Bacon.

Glen, F. & Isaacs, S. 2007. *Survey of ICT and Education in Africa: A Summary Report, Based on 53 Country Surveys* [Online]. Available: <http://www.infodev.org/en/Publication.353.html> [2010, February 10].

Jaffer, S., Ng'ambi, D. & Czerniewicz, L. 2007. The role of ICTs in higher education in South Africa: One strategy for addressing teaching and learning challenges. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 3(4): 131-142.

Johnson, R.B. & Onwuegbuzie, A.J. 2004. Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher* 33(7): 14-26.

Linckels S., Dording C., Kreis Y., Reuter R., Weber C., Meinel Ch. 2009. Teaching with Information and Communication Technologies: Preliminary Results of a Large Scale Survey. In proceedings of ACM SIGUCCS Fall Conference, St. Louis, Missouri, USA, pp. 157-162, ISBN: 978-1-60558-477-5 [Online] Available: <http://www.linckels.lu/publications/SIGUCCS2009-linckels.pdf> [2010, February 10]