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Information and communication technology skills in higher education: the case of a distance learning institution

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Abstract

It is essential for information and communications technology (ICT) to be fully utilised in order for higher education institutions to deliver effective and sustainable education in a digital world. The aim of this article is to report on the self-assessed level of ICT skills of staff in an open distance learning (ODL) institution. Important findings of the study include significant differences between academic and support staff, with academic staff claiming higher confidence levels in a number of ICT competencies. A clear age dynamic is also observable, with younger staff members (34 years and younger) displaying significantly higher confidence levels in all ICT skill categories than older staff.

The contribution of the article is that a holistic view of ICT skill levels for all staff in the institutions are identified upon which more specific individual or departmental ICT training needs analysis initiatives could be launched. It also creates a platform to allow for more targeted strategic training and development interventions to prepare staff for the digital age. Based on the exploratory work done in this study, other ODL institutions may use a similar approach when strategic ICT training and development initiatives are considered.

Key phrases

distance education, information and communications technology skills, self-assess skills, training and development

1. INTRODUCTION

Globally, higher education institutions are undergoing drastic changes. The major factors influencing change are diminishing state funding, globalisation, rapid changes in technology, as well as increased and diversified higher education providers (Daly, Reid & Buckley 2016), introduction of digital technology (Charlesworth 2016) and the expansion of e-learning (Bowen 2013). According to a report published by Ernest and Young (2012:4), "digital technologies will transform the way education is delivered and accessed, and the way 'value' is created by higher education providers".

Engelbrecht (2015) opines that the democratization of knowledge has created the opportunity for everyone to have free and open access to information. Therefore, universities cannot claim to be the sole custodians and creators of knowledge. Furthermore, distance education has played an important role in meeting the high demand for access to education, particularly in the developing world. In addition, distance education has contributed to the complex and disruptive changes that higher education is facing (Aziza 2015).

This study was conducted at an open distance learning (ODL) higher education institution in South Africa, the University of South Africa (Unisa). The university has been in existence for over 140 years and serviced almost 400 000 students in 2015 (Wessels 2015). One major challenge faced by ODL universities is to effectively manage the "transactional distance" which according to Kassandrinou, Angelaki and Mavroidis (2014:26) is defined as "the psychological and communication space between the learners and the tutor due to geographical separation". To remain competitive, ODL universities will have no choice but to transform academic product delivery from a print-based approach to an online (e-learning) design model (Arinto 2016).

In this regard, Unisa (2015:8) has clearly declared its intention and stated that one of its 2030 key strategic objectives is to be a "cutting-edge open distance e-learning (ODeL) institution". To achieve this aforementioned high level strategic objective, it is essential that the organisational ICT skills levels of staff be identified and assessed. This is also underscored by Erasmus, Loedolff, Mda and Nel (2015:137) who indicate that all activities within the organisation, especially organisational training and development initiatives, should be informed and guided by organisations' strategic objectives.

To achieve the aforementioned at an organisational level, a self-assessed ICT skills survey of Unisa staff was conducted. The identified ICT skills, although not as clearly defined as individual or group skills, will form the basis for future individual ICT training and development.

While ICT is not the solution to all the challenges facing teaching and learning, ICT solutions have become an essential means to deliver effective online products. Not only should all staff levels at higher educational institutions be trained in basic ICT skills (Brown & Mayisela 2015), but it is also vital that certain categories of staff possess advanced ICT skills. The latter applies especially to academics and support staff, who are responsible for the development of online courses. The significance of this study and the aim of this article are to obtain a holistic view of self-assessed ICT skill levels of staff at Unisa, and based on this, to recommend training and development initiatives to improve skill levels in general, and for academics in particular.

2. LITERATURE REVIEW

An important part of the literature review is to highlight the important elements of a competency framework for ODL practitioners and related aspects. However, before the aforementioned is discussed, a brief overview of the impact of ICT developments on the workforce in general is provided, and higher education in particular followed by an explanation of the concepts of e-learning and ICT's.

The world is experiencing the third wave of information technology disruption, where things are becoming cheaper, faster and stronger. Barrenechea and Jenkins (2016:4), for example, predicted that by 2020, the number of "things connected to the Internet will range from as little as three times the world's population (or roughly 25 billion) to as many as 1 trillion devices (120 times the population).

The South African estimate provided by Internet Live Stats (2016) states that 52% of South Africa's population (approximately 25,5 million) have internet access at home through some device and connection. Ng'ambi, Brown, Bozalek, Gachago and Wood (2016:843) emphasised two important facts. The first is that higher education institutions in South Africa have shifted from a "relatively poor ICT infrastructure and education provision to cloud-based

ICT infrastructure with unlimited educational resources that are freely, openly and easily available". The second is that even though "mobile and social media" are available, "teaching and learning practice in South African higher education remains largely unchanged". Bornman (2016) confirmed the Afrobarometer finding that South Africa's progress in terms of becoming an information society is relatively slow.

Given the aforementioned views, Moschella (2015) reported that to be successful in the future, an organisation must reinvent itself and endeavour to simplify, transform and accelerate its business through automated and digitised information processes.

Higher education, and in particular ODL institutions, are left with no choice but to embrace this opportunity in order to remain competitive. Lowendahl (2014) opines that Internet technology should form an integral part of a higher education institution's educational business model and that people, processes and technology cannot be separated in an endeavour to achieve organisational goals.

E-learning "involves the delivery and administration of learning opportunities and support through computer, network, distance education and web-based technology" to support individual performance and development (Erasmus *et al*. 2015:212). According to Velmurugan and Ramasamy (2014), e-learning can only be accomplished by using advanced ICT systems and powerful tools to deliver teaching and learning offerings. E-learning does have various advantages and disadvantages, but one important advantage is that it bridges the gap between a lecturer and a student in different geographical locations so that students can learn anytime and anywhere (Talebian, Mohammadi & Ahmad 2014; Velmurugan & Ramasamy 2014).

ICT's are a collection of technological resources and consist of "hardware, software, networks, and media for collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as related services" (Sakar 2012:31). More specifically, ICT hardware includes computers, scanners, digital cameras, and ICT software, as well as applications such as Microsoft Word (Doyle 2002).

According to Sadaf, Newby and Ertmer (2016), Web 2.0 technologies present educators with numerous opportunities to establish 21st century learning environments. In general,

the term *Web 2.0* comprises tools such as Facebook, LinkedIn, Pinterest, YouTube, Vimeo, Flickr, Google Drive and Dropbox (Gachago & Ivala 2015). It has been indicated recently that the Web is undergoing a new phase of change, and owing to its significant departure from Web 2, in 2006 the Web 3 is now relevant (Spivack 2016). Web 3 will be more open, intelligent and will include, among other things, machine learning and reasoning. To deliver effective online courses, a new course design mind-set needs to be developed by educators. However, in order to achieve this, professional and technical support needs to be provided by a professional team.

Certain advantages could apply when utilising ICT's in the higher education context (Farhan 2014), for example:

- faster production of knowledge at a reduced cost;
- transforming teaching and learning by means of, for example, massive online open courses (MOOCs) and open educational resources (OERs), which allow for instant access;
- increased communication and collaboration between students, facilitators and researchers; and
- online assessment allows for electronic feedback to lecturers on many aspects; and is particularly useful in enhancing teaching and learning.

With the above in mind, individual and organisational excellence can be attained by developing an ICT competency framework for training and development purposes. The term "competencies" focuses on the personal attributes or inputs of an individual and is defined as "the behaviours and technical attributes that individuals must have, or must acquire, to perform effectively at work" (Chartered Institute of Personnel and Development (CIPD) 2016). However, a competency framework is understood to be a structure that defines each individual competency required by individuals working in an organisation (CIPD 2016).

Many generic competency frameworks are in use for a variety of jobs, but only a few focus on distance learning practitioners.These include frameworks such as Arinto's (2013) framework of faculty development in ODL; frameworks by Aslami, Esmaeili, Saeidipour &

Sarmadi (2016); Baran & Correia (2014); Engestrom (2001); O'Rourke's (1993) Commonwealth of Learning Roles and Competencies in Distance Education and UNESCO ICT Competency Framework for Teachers 2011 (Williams 2003). Arinto's (2013) framework for faculty development in ODL is highlighted in more detail below.

According to Arinto (2013), academics require more than technology-related skills to be able to teach effectively online. They also need to master course design practices, which include four areas, namely content development, learning activities, teaching strategies, and assessment.

Part of the challenge is that successful online delivery requires clearly defined ICT skill competencies as part of the competency framework. Arinto (2013) also specifies basic, intermediate and advanced levels of expertise indicative of the knowledge and skills required for each level. It is also emphasised that effective teaching through technology requires technological, pedagogical and content knowledge. Moreover, the framework provides an image of the complex interplay between three primary forms of knowledge, namely, Content (CK), Pedagogy (PK), and Technology (TK).

In addition, Kirwan and Roumell (2015) argue that for an effective online practice to emerge, the roles, characteristics and dispositions of the educators are important. They suggest a model for online educator dispositions, consisting of cognitive, pedagogical and social presence in an online learning environment (Kirwan & Roumell 2015).

Further to above attention should also be given to the influence ICT's will have on aspects such as age, gender, population groups, and workload of staff. In case of age, Samuel (2016:233) reports that younger academics from the connected generation "equated technical proficiency with the ability to teach online" and consequently, saw little or no need to attend training and development programmes.

However, on the other hand, compared to younger people, older employees need more support in terms of training in the areas of modern management techniques, project management, and in-depth knowledge of the IT field (Soja & Soja 2016). With regard to ICT's and gender, the Broadband Commission (2015:44) found that 21% of "women in the

developing world are less likely to own a mobile phone than men in the developing world and nearly 25% fewer women than men have internet connectivity".

With regard to different population groups, Bornman (2016) found that in South Africa, whites use ICT's considerably more than other population groups. It is further reported that "group differences could probably also be ascribed – at least partly – to differences in educational levels and income and that social and cultural dynamics could, however, also play a role". (Bornman 2016: 276). The increased usage of ICT's will also require staff to adjust their workload (Bezuidenhout 2015; Gous & Roberts 2015; Gregory & Lodge 2015). In this regard, Haggerty (2015:207) found that "professional development (or a lack of it) impacts significantly on how academic staff is able to manage their workloads" and that "professional development needs to focus on pedagogy and practice of teaching and learning, rather than mastery of the technological aspects of online learning".

To ensure a measure of success, it is essential to introduce ICT change management initiatives. The inculcation of an ICT mind-set among staff is essential and an incentive programme is put in place in order to motivate staff to use ICT tools (Madiope & Govender 2015; Scheepers 2015). Academic leaders such as chairs of departments (Knight, Tait & Yorker 2006) and deans should take the lead, not only to drive the digital change initiative, but also to recruit talent with a digital mind-set. In this regard, Scheepers (2015) argues that development and demonstration of digital literacy should be a prerequisite during new recruits' probation period.

3. RESEARCH APPROACH AND METHODOLOGY

In this study, both exploratory and descriptive research methods were applied (Joubert 2015). The nature and extent of the required ICT skills and competencies were investigated during the exploratory phase. This phase commenced with desk research aimed at identifying possible ICT skills and competencies to be included in designing a research instrument.

Furthermore, literature on ICT skills was perused to gain a better understanding of issues relevant to the study. Six qualitative in-depth interviews with ICT training specialists and

practitioners were conducted, during which specific core ICT skills domains were identified and examined for inclusion in the research instrument.

In addition, consideration was given to the fast-changing ICT environment and changes in strategic direction within the institution where the research was conducted. The final step in this phase included further in-depth interviews with three ICT experts to discuss and refine the specific ICT domains and sub-domains. Thirteen (13) core ICT domains and a total of 82 sub-skills were consequently identified. In this article, "core" refers to the essential domains required. Whether basic, intermediate or advanced skill levels are required per domain will be dependent on individuals' function and tasks within the institution. The exploratory phase proved to be particularly useful in generating a number of initial concepts, and served as an important precursor to the descriptive phase.

The descriptive research phase entailed defining the research population, constructing an online questionnaire, collecting, processing, and analysing the data. The population comprised 4659 staff members representing 143 academic and support entities throughout the university. A response rate of 41.3% or 1926 respondents (642 academics and 1284 support staff) was achieved. The response rates for academics and support staff were 39.1% (642/1641) and 42.5% (1284/3 018) respectively. Staff members were invited via e-mail to visit a website using the Qualtrics software platform (Copyright © 2015, Provo, UT, USA) in order to complete an online questionnaire by clicking on the hyperlink provided for the study.

A 5-point confidence scale was used to rate the 13 core ICT domains and 82 sub-skills identified in the exploratory phase. Respondents were required to indicate whether they had no experience, limited experience, were regular users, and whether they were confident or experts in applying a particular sub-skill. Allen and Van den Velden (2005) opine that respondents participating in a self-assessment of this nature are "probably the best informants about their own skills" but also caution that "no method of measuring skills is without its flaws". However, erudite execution of the research methodology should contribute to mitigating most of these flaws.

The 13 core ICT domains are reflected in exhibit 1.

EXHIBIT 1: ICT domains

Domain	Examples
Multimedia	Drawing and editing exhibits, figures and tables
Presentation	Modifying standard presentation templates/themes
Network	Connecting to shared network drives and actively scanning for viruses
Office productivity	Using on-line help
Internet	Finding and downloading different sources of information
Spreadsheet	Creating spreadsheets, entering formulas, sorting and filtering data and creating pivot tables
Mobile devices	Accessing the internet, sending and receiving e-mails, texting and using various apps
Hardware	Adjusting screen contrast and brightness
Word processing	Using a word-processor
Operating systems	Setting up, create and using secure passwords
ICT infrastructure	Using electronic human resource and finance platforms
Teaching, learning and research	Using learning management systems, knowledge and awareness of OER's
Email	Using emails and all its functionalities

Source: Adapted from Joubert 2015:7

To ensure the internal consistency or reliability of questionnaire items, a Cronbach Alpha's test was conducted. This test revealed a Cronbach's alpha of 0.98, which indicated a high level of internal consistency. Data were analysed using the IBM SPSS 23 software program.

4. RESULTS AND DISCUSSION

A quartile analysis was conducted to assist in the interpretation of skills confidence levels within the skills domains. The median score or intervention point of 3.29 was used to divide ICT skills confidence levels into quartiles, with a 75th percentile value of 3.35 and a 25th percentile value of 3.03. Scores of below 3.03 or quartile 1 indicate that the skills levels are critical and require urgent intervention, such as advanced training. Scores between 3.03 and 3.28 or quartile 2 suggest that these skills are in need of development; hence requiring reactive intervention. This could include attending basic training. Scores above 3.29 or quartiles 3 and 4 denote a positive response requiring proactive interventions or maintaining

skill levels, such as refresher training. It must be noted that the results of the survey and subsequent training and development initiatives will be informed by an individual's job profile and the departmental strategic role within the institution.

4.1 Overview of the various core skill domains

The analyses below will include a summarised, high-level overview of the 13 core ICT skill domains within the institution, as reflected in Table 1.

TABLE 1: OVERVIEW OF CORE ICT SKILL DOMAINS

ICT SKILLS SET	Mean (*n*=1 926)	Standard deviation
Multimedia usage and manipulation	2.53	1.17
Spreadsheet (e.g. Excel)	2.80	1.27
Presentation software (e.g. PowerPoint)	3.04	1.18
Teaching, learning and research	3.07	3.24
Network and other	3.08	3.19
Office productivity - general	3.09	3.13
Using the Internet	3.40	0.92
Using mobile devices	3.46	1.16
Using ICT infrastructure	3.46	0.88
Hardware	3.50	0.98
Word processing (e.g. MS Word)	3.57	0.90
Operating system (Windows)	3.73	0.88
Email	3.83	0.90
Average	3.27	0.84

Source: Calculated from the survey results

This was followed by an analysis of academic and support staff within the institution, with the aim of highlighting academic skills and competency levels.

Table 1 indicates that staff members feel reasonably confident about their e-mail, operating system, hardware, and word processing skills. They also seem to opine that they are skilled in the use of institutional ICT infrastructure and systems, mobile devices and the Internet. Limited experience was reported in respect of the skills required for network, teaching, learning and research, presentation software, and office productivity, while little or no experience was indicated for spreadsheets and multimedia usage and manipulation. It is noted that the domains of teaching, learning and research (only academics responded), network and office productivity skills display higher standard deviations, indicating greater differences in reported skill levels. The following section investigates self-reported ICT proficiency levels for the academic and administrative support staff cohorts.

4.2 Academic and administrative staff skills levels

An analysis of variance (ANOVA) was conducted to test the significance of the observed differences between the mean scores of academic and administrative staff for each of the core skills domains at a $p \leq 0.05$ level of significance. However, the administrative staff members were not required to respond to the domain of teaching, learning and research. The core ICT skill domains for academic and administrative staff are reflected in Table 2.

Table 2 shows that academic staff claims to have significantly more confidence in 10 of the 13 skill domains. The sub-skills explaining most of the differences between academic versus administrative skill domains are multimedia usage, presentation software, network, office productivity, using the Internet, online open educational resources, mobile devices, hardware, word processing, and operating systems skills, such as creating, renaming and moving folders and subfolders.

These results indicate that the ICT skills required for academics clearly differ from those required for administrative staff. Academics feel, for example, more confident and experienced in multimedia usage and presentation skills than administrative staff, as these skills are not usually required from administrative staff.

TABLE 2: ACADEMIC VS ADMINISTRATIVE STAFF

ICT SKILLS SET	Academic (n=760)	Administrative (n=1 159)
Multimedia usage and manipulation*	2.65	2.44
Spreadsheet	2.85	2.77
Presentation software *	3.29	2.87
Teaching, learning and research*	3.24	—
Network and other*	3.21	3.00
Office productivity general*	3.15	3.06
Using the Internet*	3.56	3.30
Using mobile devices*	3.53	3.41
Using ICT infrastructure	3.46	3.46
Hardware*	3.58	3.44
Word processing *	3.74	3.46
Operating system *	3.80	3.69
Email	3.84	3.83
Average	3.38	3.23

Note * $p \leq 0.05$

Source: Calculated from the survey results

No significant differences were detected in three core skills, namely, email, ICT infrastructure, and spreadsheet skills.

To explore possible differences further within the academic sector, academic ranks from professor to junior lecturer were analysed. Tests to determine the significance of differences

are based on two-sided *t*-tests assuming equal variances, adjusted for all pairwise comparisons within rows using the Bonferroni correction.

4.3 Academic ranks

Core ICT skill domains for academic ranks are indicated in Table 3.

Table 3 indicates that junior lecturers seem to display higher levels of confidence in the ICT skill domains of multimedia usage and manipulation, teaching, learning and research, ICT infrastructure, mobile devices, and spreadsheets.

This finding could, among others, be attributed to junior lecturers being younger and more exposed to the digital world and ICTs from an early age than academics in higher ranks. Of particular interest is the domain of teaching, learning and research. Three sub-skills, namely, (i) using of OERs as part of formal courseware, (ii) using learning management system tools such as wikis and blogs, and (iii) creating, uploading and activating self-assessment questions, achieved lower confidence levels among more senior academics. The importance of this particular sub-domain in relation to academics cannot be overemphasised as it forms the basis of an online teaching and learning environment.

When considering planning, training and development initiatives, cognisance should be taken of the different ICT skills' confidence and experience levels. These findings present an opportunity to develop or refine an ODL practitioner's competency framework in order to reflect the differences between academic and administrative staff.

The sections below investigate the differences between academic and administrative staff in more detail, by further analysing the age, gender and population group characteristics of academic and administrative staff. Tests to determine the significance of differences between the mean scores of the various demographic segments are based on two-sided *t*-tests assuming equal variances.

Furthermore, tests were also adjusted for all pairwise comparisons within a row, using the Bonferroni correction.

TABLE 3: ACADEMIC RANKS

ICT SKILLS SET	Junior lecturer (n=28)	Lecturer (n=169)	Senior lecturer (n=194)	Associate professor (n=68)	Professor (n=99)
Multimedia usage and manipulation*	3.08*	2.72*	2.64	2.64	2.52*
Spreadsheet *	3.16	2.86*	3.06	2.67	2.50*
Office productivity - general	3.41	3.22	3.15	3.09	3.20
Network and other	3.49	3.34	3.20	3.25	3.46
Teaching, learning and research*	3.53*	3.45	3.25	3.39	3.23*
Presentation software	3.62	3.45	3.32	3.38	3.40
Using Unisa ICT infrastructure*	3.67*	3.49	3.34*	3.42	3.38
Using mobile devices*	3.92*	3.58	3.55	3.38*	3.39
Hardware	3.60	3.61	3.55	3.55	3.75
Using the Internet	3.78	3.69	3.52	3.57	3.60
Word processing	3.81	3.76	3.75	3.90	3.92
Email	3.82	3.94	3.82	3.87	3.78
Operating system	3.92	3.89	3.73	3.80	3.95
Average	3.60*	3.46	3.38*	3.38*	3.39

Note *$p \leq 0.05$

Source: Calculated from the survey results

4.4 Academic and administrative staff by age

The core ICT skill domains for academic and administrative staff by age are reflected in Table 4.

TABLE 4 : ACADEMIC AND ADMINISTRATIVE STAFF BY AGE

	Age											
	<= 34		35 - 41		42 - 48		49 - 55		56+		Total	
ICT SKILLS SET	Acad (n=179)	Admin (n=215)	Acad (n=151)	Admin (n=253)	Acad (n=125)	Admin (n=270)	Acad (n=153)	Admin (n=232)	Acad (n=142)	Admin n=289	Acad (n=760)	Admin (n=1159)
Multimedia usage and manipulation*	3.25*	2.92	2.60	2.69	2.54	2.39	2.40	2.09*	2.32	2.08	2.65	2.44
Spreadsheet	3.47	3.21	2.88	3.01	2.73	2.67	2.64	2.55	2.35	2.42	2.85	2.77
Office productivity - general	3.43	3.34	3.10	3.23	3.12	2.95	3.03	2.85	3.00	2.90	3.15	3.06
Network and other*	3.49	3.22	3.02	3.14	3.22*	2.92	3.15*	2.85	3.12*	2.85	3.21	3.00
Presentation software*	3.65	3.16*	3.22	3.07	3.29*	2.77	3.17*	2.73	3.06*	2.60	3.29*	2.87
Using ICT infrastructure	3.72	3.60	3.44	3.64	3.48	3.45	3.33	3.34	3.30	3.23	3.46	3.46
Using mobile devices*	4.22	3.99*	3.55	3.80	3.51	3.37	3.16	3.01	3.04*	2.81	3.53	3.41
Using the Internet*	3.90	3.67	3.54	3.48	3.57	3.24*	3.37	3.07*	3.40	2.99*	3.56	3.30
Hardware	3.83	3.57	3.47	3.58	3.56	3.37	3.49	3.38	3.48	3.29	3.58	3.44
Word processing (e.g. MS Word)*	4.02	3.71*	3.65	3.57	3.66	3.34*	3.67	3.29*	3.64	3.37	3.74	3.46
Operating system (Windows)	4.13	3.93	3.66	3.81	3.73	3.60	3.73	3.57	3.68	3.54	3.80	3.69
Email*	4.20	4.08	3.81	3.90	3.77	3.73	3.70	3.73	3.61	3.74	3.84	3.83
Average	3.80	3.53	3.32	3.41	3.30	3.15	3.18	3.04	3.10	2.98	3.33	3.23

Note *$p \leq 0.05$

Source: Calculated from the survey results

Table 4 shows that significant age differences are apparent in seven ICT skill domains.

Younger academic and administrative staff (≤34) expressed more confidence and experience in the domains of multimedia usage and manipulation, network and other, presentation software, using mobile devices, using the Internet, word processing, and email. Younger academic staff also expressed more confidence and experience than administrative staff.

This finding is also apparent among the other age groups, with a notable exception in the 35-41 age group, where the administrative staff reported more or comparable confidence and experience in all the ICT skill domains. These findings resonate with the remarks of Samuels (2016) and Soja and Soja (2016) as mentioned above.

Table 5 indicates that significant differences are apparent in nine ICT skill domains, with males expressing higher levels of confidence in these domains.

The dominance of males in the ICT environment could possibly be a legacy of the historic differences reported above (Broadband Commission 2015). In particular, females tend to have more career interruptions and possibly less time to engage in ICT technologies and developing further competencies owing to more family responsibilities.

4.5 Academic and administrative staff by gender

The core ICT skill domains for academic and administrative staff by gender are indicated in Table 5.

Table 5 indicates that significant differences are apparent in nine ICT skill domains, with males expressing higher levels of confidence in these domains.

The dominance of males in the ICT environment could possibly be a legacy of the historic differences reported above (Broadband Commission 2015). In particular, females tend to have more career interruptions and possibly less time to engage in ICT technologies and developing further competencies owing to more family responsibilities.

TABLE 5: ACADEMIC AND ADMINISTRATIVE STAFF BY GENDER

	Female		Male		Total	
	Acad (n=442)	Admin (n=700)	Acad (n=318)	Admin (n=359)	Acad (n=760)	Admin (n=1159)
Multimedia usage and manipulation*	2.44	2.26	2.95*	2.71	2.65	2.44
Spreadsheet	2.69	2.70	3.07*	2.90	2.85	2.77
Office productivity – general*	2.99	2.96	3.36*	3.20	3.15	3.06
Network and other*	3.02	2.80	3.48*	3.30	3.21	3.00
Presentation software *	3.15	2.77	3.49*	3.03	3.29	2.87
Using Unisa ICT infrastructure	3.43	3.44	3.51	3.49	3.46	3.46
Using mobile devices*	3.44	3.33	3.65*	3.55	3.53	3.41
Using the Internet*	3.46	3.23	3.69*	3.40	3.56	3.30
Hardware	3.41	3.31	3.82	3.64	3.58	3.44
Word processing *	3.71	3.46	3.79*	3.45	3.74	3.46
Operating system *	3.68	3.58	3.96*	3.85	3.80	3.69
Email	3.83	3.83	3.85	3.83	3.84	3.83
Average	3.26	3.14	3.53*	3.36	3.38	3.23

Note *$p \leq 0.05$

Source: Calculated from the survey results

4.6 Academic and administrative staff by population group

Core ICT skill domains for academic and administrative staff by population group are reflected in Table 6.

TABLE 6: ACADEMIC AND ADMINISTRATIVE STAFF BY POPULATION GROUP

	African		Coloured		Indian		White		Total	
ICT SKILLS SET	Acad (n=305)	Admin (n=599)	Acad (n=18)	Admin (n=60)	Acad (n=38)	Admin (n=40)	Acad (n=400)	Admin (n=557)	Acad (n=760)	Admin (n= 1159)
Multimedia usage and manipulation*	2.55	2.38	2.72	2.59	2.74	2.81*	2.71	2.47	2.65	2.44
Spreadsheet	2.71	2.76	2.97	2.74	2.86	2.99	2.94	2.78	2.85	2.77
Office productivity*	2.97	2.98	3.26	3.02	3.03	3.31*	3.28	3.14	3.15	3.06
Network and other*	2.86	2.80	3.48	3.11	3.05	3.37	3.48*	3.20	3.21	3.00
Presentation software	3.04	2.80	3.40	2.99	3.28	3.45	3.47*	2.89	3.29	2.87
Using ICT infrastructure	3.45	3.43	3.25	3.41	3.35	3.62	3.50	3.50	3.46	3.46
Using mobile devices*	3.51	3.53	3.79	3.56	3.72	3.92*	3.52	3.20	3.53	3.41
Using the Internet*	3.40	3.26	3.68	3.34	3.54	3.64	3.67*	3.30	3.56	3.30
Hardware*	3.33	3.30	3.69	3.54	3.41	3.87*	3.78	3.58	3.58	3.44
Word processing*	3.46	3.34	3.93	3.52	3.81	3.89	3.94*	3.56	3.74	3.46
Operating system	3.60	3.60	4.01*	3.68	3.65	3.90	3.96*	3.79	3.80	3.69
Email*	3.60	3.73	3.93	3.73	3.93	4.12*	4.00	3.96	3.84	3.83
Average	3.20	3.16	3.42	3.27	3.39	3.57*	3.47	3.28	3.35	3.23

Note *$p \leq 0.05$

Source: Calculated from the survey results

Table 6 shows that Indian and White respondents expressed higher confidence in 10 of the 13 ICT skills domains. It is imperative that the confidence levels among population groups be highlighted to ensure that targeted action is taken in future training and development endeavours. In this regard, Employment Equity (EE) as a national imperative in South Africa provides guidelines and Unisa's EE policy intends to address the imbalances of the country's past racial discriminatory practices and errs.

5. LIMITATIONS OF THE STUDY

A limitation of this study is that only the views of job incumbents were obtained, and not the views of supervisors and other stakeholders. The fact that the specific ICT competencies to achieve strategic organisational objectives have not been determined does not allow for a well-crafted, individualised training needs analysis plan.

Future research endeavours should focus on doing a comprehensive training needs analysis, by identifying departments which will allow for a more targeted approach. According to Colbert, Yee and George (2016), it is also important to recognise the power of technological advancements. Therefore, further research should be undertaken on how best to guide a digital workforce to achieve the desired goals. However, management should also be made aware of the negative effects of technology developments on the workforce.

In this study, the importance of ICT skills development in higher education has been highlighted, and the above recommendations suggest how higher education institutions could address ICT skills gaps in general and ODL institutions in particular. The study had clearly shown that the sustainability and competitiveness of higher education institutions depend largely on the integration and adaptation to the changing ICT landscape.

6. RECOMMENDATIONS

It is recommended that:

- An ODL practitioner competency framework be developed to ensure that academic staff, in particular, is exposed to effective and efficient training and development practices. In an endeavour to plan for training and development interventions, course design

principles, technical expertise and online academic dispositions should be presented and mastered as an integrated whole. There is no doubt that the professional development of ODL practitioners is a multifaceted practice which necessitates an unwavering commitment from universities to continuously improve learning material and to encourage life-long learning.

- An incentive programme is put in place in order to motivate staff to use ICT tools (Madiope & Govender 2015; Scheepers 2015). However, the availability of ICTs does not imply that all academics will voluntarily use technology in their teaching.
- Caution should be exercised in using a blanket approach to improve ICT competency levels. The significant differences between academic and administrative staff, age, gender, job profiles, and population groups and various ICT skill levels, for example basic, intermediate and advanced levels of expertise(Arinto 2013), should be considered when devising intervention strategies.
- A review of universities policies should be undertaken, especially for those related to teaching and learning and the use of technology. Furthermore, the role of academics in ODL institutions should be redefined to place more emphasis on improving teaching and learning excellence and student throughput. This new focus will challenge the traditional trilogy of academics' tasks, namely, to teach, do research, and participate in community engagement.
- The academic product delivery model should be transformed from one which is mainly paper-based to a technology-based online model. This will require a reliable ICT systems management plan and a professional cohort of ICT specialist.
- An organisational wide ICT change management programme should be planned and executed. Priority should be given to the academic sector and support departments directly involved with online product delivery.
- Developing staff in online course design should be part of an all-inclusive faculty development initiative, and could include workshops with opportunities for experimentation.

7. CONCLUSIONS

Self-assessed ICT skill levels based on the respondents' job profiles provide a picture of the current ICT skill levels within one ODL higher education institution. The gap between the current confidence in ICT skill levels and Unisa's ICT 2030 strategic focus has been identified.

Based on the results, 11 of the 13 ICT core skills domains identified during Phase 1 of the research do not require urgent training and development interventions. However, the two lowest ranked domains, namely, the use of spreadsheets and multimedia usage and manipulation, do require urgent training and development interventions.

For five of the ICT skills domains (networks, teaching, learning and research, presentation software, and office productivity), limited confidence and experience were reported. This means that training and development interventions will also be required.

The remainder of the ICT skills sets are viewed as being adequate, and refresher training will most probably be required. However, further analysis shows significant differences between academic and administrative staff, occupational levels, age, and gender groups.

Therefore, specific ICT training will have to be considered in certain ICT domains. More importantly, younger male academic and administrative staff expressed more confidence and experience in the domains of multimedia usage and manipulation, spreadsheet, office productivity, network, presentation software, using mobile devices, using the Internet, word processing, email and operating system skills. Male academic staff generally also expressed more confidence and experience than administrative staff in all ICT domains.

Although academics are fairly proficient in the majority of ICT skill categories, this does not imply that academic and support staff directly involved with the development of online courses are sufficiently skilled. They may have basic ICT skills levels but certain intermediate and advanced skill levels are required (Arinto 2013). Ideally, specialist e-learning support staff departments should, in some instances, be more skilled than academic staff.

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